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GOUT—A FORGOTTEN DISEASE*

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MANY years ago a querulous man hobbled into my examining room berating fate, doctors and pharmaceuticals because his "rheumatism" was killing him and no relief was forthcoming. He was obese and conditionally alcoholic. That, defined, means his truculence was only enhanced by periods of sobriety. His lament as to medicine arose from the circumstance that five years previously a doctor in Georgia had given him some medicine that "cured" him overnight. All medicine taken since that time suffered equally with him in exhibiting superb futility.

To look at him casually, one would say "rheumatoid or infectious arthritis." Yet, while he later suffered some permanent osteo-arthritic changes, the joints most painful and swollen retained no essential disability in remissions. Casting about for an answer to the identity of this wholesome and overnight Georgian remedy, it suddenly dawned upon me "this man must have gout." And so began a long association with a man who taught me a great deal about gout. On many occassions, I confess, he must have passed fully out of my mind, for I know I join with most Minnesota physicians in frequently overlooking gout. Indeed, "out of mind is out of heart."

It is for this reason that I title my discussion "The Forgotten Disease." Somehow there has grown up a tradition that gout is a disease of Merrie Old England, and that it occurs but rarely in America. There are no present available statistics for gout with us. It is very poorly cross-indexed in our clinics and hospitals; it likely never figures as a primary cause of death; I have never seen it mentioned in our autopsy protocols, even where gout was diagnosed and known to be present in life. For instance, my gouty friend never got over his gout, but it didn't cause his death—that came with hypertensive, myocardial failure. In the course of his stormy life it became harder and harder to terminate his immediate attacks. Once W. A. O'Brien was a visitor. This man came in with a grotesquely enlarged and swollen forearm to the elbow. The hand was puffy, purple red and only moderately painful. To "O.B.," I said, "Take one look and make a diagnosis." He did so and replied, "Lymphangitis." Then I asked him why the man had no fever, and why this came on over night—all too rapidly for any obvious infection. In short, he was quite abashed by my statement that this grotesque arm was gout. I had seen it before. Under colchicum and cinchophen, the arm was normal appearing in thirty-six hours. I have never seen such an extremity in anyone else.

Specialism has carried medical service to the point that, where available, patients are prone to bring their somatic distresses directly to some doctor covering that anatomical assignment. It is good that well trained specialists do not forget constitution and general physical background. An obese butcher, aged 58, is a case in point. He had been a heavy beer drinker and a lover of plenty of fat meat. He selected the fattest cuts and ate the fattest portions. Late in October, 1939, he had complained of ankle soreness and a swelling at the base of the right great toe. A physician advised him to take cinchophen. On November 21, 1939, he consulted Ophthalmologist Frank Knapp on account of a very striking condition suddenly obtaining the previous evening in his

*From the Department of Medicine, The Duluth Clinic. Read before the Minnesota Society of Internal Medicine, Rochester, Minnesota, November 11, 1940.

right eye. There developed an edema, swelling, redness and sense of heat in the right eye. There was no definite pain but a constant sense of itching. Doctor Knapp recognized the oddity of this development and sent him for a general checkup. He volunteered at once the history of beer drinking and fondness for fat, and directed my attention to the pains and distresses in his feet, all betokening gout. We found the uric acid of his blood to be 5 mgm. per cent. This was repeated several times over a period of two weeks and never dropped to our normal* during the period of observation. Suffice it to state that through giving the patient colchicum, modifying his diet and eliminating beer, his eyes were restored to normal in three days.

Thereupon Dr. Frank Knapp went back into the literature and informed me that he did not find much currently, but he found the following which I have excerpted from a report made fifty-six years ago by the famous Jonathan Hutchinson.[5] This is most illuminating.

"There is a condition which, for want of a better name, I have for long been in the habit of recognizing as Hot Eye. It is one of the many curious phenomena which attend quiet gout. I use the term quiet gout as distinct from acutely paroxysmal gout. In families liable to gout, one person who becomes the subject of acute attacks of podagra—what is known as "unequivocal gout"—there are often half a dozen who are the subjects of minor symptoms which denote a similar tendency. . . . Amongst the frequent occurrences which denote its presence are repeated short attacks of congestion of the eye. Usually one only is affected, but sometimes both. The conjunctiva becomes red, and the eyeball feels hot, and pricks, as if sand were in it. The attack may come on within half an hour of the meal which has disagreed, and it may last a few hours, or a day or two.

"A further practical note I must ask leave to make. It is to the effect that many cases of irritable, hyperesthetic and easily tired eyes in young persons are in association with inherited gout. I feel sure that in some of these cases we are in the present day in danger of pushing the recommendation of spectacles to an excess.

". . . Such patients will often state that they are very susceptible to the influence of beer and wine, and that malt liquor and some wines almost always cause indigestion, and make the urine muddy. These dietetic disturbances, to which as a test of gout attention was, I think, first claimed by Sir James Paget, are very important and valuable."

*The uric acid tests have been done in our laboratory with whole blood according to Benedict's modification of the Folin technic with an average normal 3 mgm. per cent. Those using blood serum with blood collected under oil report an average normal of 6 mgm. per cent.

Wood,[9] a South African, as late as 1936 referred back to Hutchinson's article and reported a series where ocular manifestations of gout again appeared exemplifying the outstanding feature of "hot eye." Wood found some association of iritis and some of his cases had gone on to destruction of the eye. Those interested should consult his article.

A certain Slovanian servant girl came under my observation at about the time (1939) that Lockie[6] published his article pointing out the relationship of gout to metabolism of fat. This girl weighed 210 pounds when only seventeen years of age. She oozed through any confining wardrobe. To make matters worse, her considerable surface area gave greater opportunities for expansion to a psoriasis that sort of negatived any incentive to dieting and attaining a svelte silhouette. Nevertheless, there came a day when the family said, "Something must be done about it." She began a period of 800 calorie intake and within eight days had severe gouty arthritis. Immediately, as the ordinary food intake is restricted, an obese subject is automatically exposed to a high fat, or even a ketogenic diet. This may also help to explain exacerbations of gout after operations or injuries where the patient eats much less than usual. I have seen a similar "hot eye" in a very obese young man soon after he went on a restricted diet. I could not, however, establish any hyperuricemia.

According to Hench,[2] not more than 3 per cent of gout occurs in women. This figure seems low. Hill[3] gives his "English statistics" reporting approximately twenty-four per cent in women. Hench and Vanzant collected their cases chiefly in the arthritic section of the Mayo Clinic. The English have had a long historical and literary, not to say political, contact with gout. It is possible that they may attribute over much to gout; and we in America are over-zealous in attempting to attribute much arthritis to focal infection. Confusion is most likely to occur in differentiating rheumatoid arthritis (infectious?) from gout. Indeed, it is possible that both conditions may override.

A woman librarian, forty years old, illustrates the possible diagnostic difficulties. She has the meticulous and exact personality seen traditionally in those women sensing the gradual invasion of an arthritis too obvious to ignore and too silent to disable. She noticed trouble in one

finger six or seven years previously. This joint spindling remained remarkably localized. Before I first saw her she had been given intravenously Wetherby-Clawson vaccine. She was very desi-

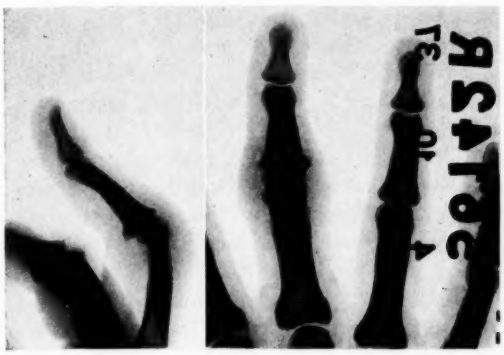

Fig. 1. The woman, aged forty, a librarian, discussed in the text. The punched-out areas are obvious.

rous of continuing it. She never showed any definite reaction one way or another. It was the same with various other methods of treatment tried over a period of three years. She would show an occasional flare-up in this one finger, or a few other finger joints would swell casually. Not until her ankles joined in the progression did I resolve to try out the injections of gold salt. This treatment was carried out meticulously at an arthritic clinic connected with one of our large universities where she spent the past summer doing graduate work. Nothing special happened. She returned to Duluth in the early fall. As long as she rested, she was better; when tired, or using her joint unduly, she was worse.

Suddenly she had a flare-up with especial swelling of the ankles. Then she drew my attention to the very obvious bilateral olecranon bursitis.* Despite normal blood levels (3 mgm. per cent) of uric acid, she has up to date responded to colchicine therapy vastly better than to any previous treatment. It is my understanding that present roentgen opinion does not hold that typical "punched-out areas" are necessarily due to gout. It is also mentioned in various articles in connection with rheumatoid arthritis. Comroe's[1] book gives an outline of roentgen differentiation of gout and rheumatoid arthritis. The reproductions he gives lend confusion, but that is apt to follow when attempting to reproduce finer roentgen film detail. Figure 1 is a reproduction from this patient. Figure 2 is introduced for comparison from a supposedly "prov-

Fig. 2. This is presented for comparison with Figure 1. The two seem very similar. She consulted me in July, 1940, simply for a check on the uric acid of the blood, while vacationing here. Her story was similar to my patient's—"had been studied at various clinics and universities in Chicago," where, she stated, "they finally decided I had gout although women aren't supposed to have it, and the treatment helped me at once." I found uric acid values to be 3.2 mgm. per cent.

en" instance of gout in a woman, aged fifty-eight.

As to the question of uric acid levels, Hench has reported that he has seen unquestionable gout with uric acid levels as low as 2 mgm. per cent. Smyth[7] reports that he has seen hyperuricemia in members of the families of gouty patients without any special symptoms. I have not seen marked drops in uric acid levels at all proportional to the clinical benefits after treatment with colchicine. In general, therefore, the definite relationship of gout to uric acid still offers many moot problems. While glycosuria occurs in diabetes, no one is likely to confuse either glycosuria or hyperglycemia with the cause of the disease.

As to whether gout is a metabolic disease or not, Talbott and Coombs[8] have studied the problem and their conclusions are noteworthy. Their article should be consulted not alone for this feature, but also for an excellent statement of the

*Said to occur three times as often in gout as in any other condition.

method, the advantages and the rationale of the treatment of gout wih crystalline colchicine, both during acute exacerbations and in quiet remissions.

It remains, therefore, either to affirm or challenge the therapeutic response of 0.5 to 1 mgm. of colchicine given at two or three hour intervals up to tolerance (digestive irritation and diarrhea) as a diagnostic procedure. Colchicum is said to be specific for gout only. Loskie's high fat, low protein and low carbohydrate diet is based on his experience where nine out of ten individuals in remission were given an attack by this diet; and they were promptly taken out of the attack by the administration of colchicine. Therefore, it would appear that high protein diets, as formerly so much held, are less responsible than the "high rich foods" so often consumed with liberal amounts of alcohol by gourmets. The final conclusion regarding diet by Talbott and Coombs agrees with this contention.

Tophi in my experience have been rare, especially in mild or borderline cases. In any case, the literature mentions only a 60 per cent incidence. I recall a man who drew my attention to aural tophi. At the time had no gouty symptoms; however, within a few weeks he developed, after a trivial blow on the lower leg, a very tender, swollen area. It cleared at once with colchicine. I am sure that had I not noticed his ears, gout would never have entered my mind. Later on he developed occasional twinges, but for the most part has very little trouble.

At intervals a chart comes to me and going back over it I notice that I treated obvious gouty attacks in patients who now appear with the infirmities of age. Certain afflictions once established, such, for example, as diabetes, tend to dominate a patient's life. This does not appear to be the situation with most of the gout I have encountered. Hench's well-known "twenty points" (1938) have repeatedly helped to "tune me in on the right wave length" in order to suspect and interpret gout. His citations of sudden development, association with slight trauma, exposure to cold, postoperative reactions, and nocturnal alarms after seasonal, familial or goodfellowship gatherings—all these items so well catalogued by Hench should be occasionally reviewed, both to further our own survival and advance our medical effectiveness.

A 50-year-old, obese executive illustrates this association. Among those who have golfed with him, his proficiency at the nineteenth hole has been the subject of comment and perhaps some emulation. The next day after such an exhibition I saw him with what he called "blood poison" on the dorsum of the foot, occasioned by "the overtight lacing of his shoe." The uric acid of his blood was 5.2 mgm. per cent.

I have made it a point to swear such mild victims of gout to a certain amount of secrecy concerning their disability. In the first place, I have told them that the indications were only suggestive and that it might take two or three decades to establish whether their malady was an accomplishment in good living, or retribution for misapplied efforts. So far as I have been able to judge, there are none so poor that they may not have a gouty inheritance, a love of fatty rich food and a yearning for the cup that cheers. In any case, rich or poor, no gouty subjects get as much sympathy as ribbing—therefore, within reason, they should not broadcast their affliction.

Summary and Conclusions

This conversational account of gout is the disease—chiefly in the atypical form—as I have seen it. It is intentionally drafted to avoid monographic pretentions. I am assuming that where we suspect gout, a voluminous literature from which to refresh ourselves with details is at hand. Gout is practically as enigmatic as when Sydenham had it and described it (see historical review of Hormell[9]). While we may quibble over whether to catalogue it as a metabolic process or not, we cannot deny its familial tendency and constitutional background. Uric acid is deposited in the tissues in certain areas; nevertheless, rich, fatty diets (Lockie) and alcohol (beer and ale) precipitate attacks. These come in individuals with a certain background or gouty diathesis. However, Hench codified a list of many other trigger factors. The disease does not kill and is therefore lost, for the most part, to statistical enumerations. The x-ray offers little in the way of positive selective criteria. Colchicine as a therapeutic test in acute attacks is more determinative than either hyperuricemia, the presence of aural tophi, or bursitic accumulations. Gout is a disease ideally suited to sharpen the physician's clinical acumen and judgment. Without these faculties it will be frequently overlooked.

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PRACTICAL POINTS IN FEMALE SEX HORMONE THERAPY*

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THE subject of endocrinology, particularly as related to the female sex organs, presents a fascinating field for study and speculation. The vast experimental work, which is constantly being carried out on laboratory animals, is rapidly correlating the somewhat confusing, isolated findings into a semblance of order, so that we soon will have a perfectly plain rationale of treatment for the hormonal deficiencies.

In my opinion, the greatest weakness in this field of medicine is in diagnosis. This will not be corrected until there are simple, easy laboratory procedures developed, which will allow the practitioner to assay the amounts of the various hormones and their relation to the normal, which may be present in the individual patient. It is true that these tests can be carried out in experimental laboratories now, but they are not yet generally available to the profession. When this condition is corrected, treatment by the practitioner will be conducted on a more rational basis.

The whole subject of female endocrinology is a little confusing at times, particularly in view of the apparent contradictory advice given to use different hormones for the same condition. As an example, both gonadotropic hormone and progesterone are advised in the treatment of functional uterine bleeding in young women. This is not contradictory advice, but only different physiological methods of attaining the same result, namely, the converting of a hyperplastic cystic endometrium into a secretory endometrium which will result in a normal complete menstruation.

The subject is so vast, and new facts are coming to light so rapidly, that it is not possible in a paper of this kind to even attempt to cover the field or review the literature. It is thought that a brief, simplified résumé of the present status of endocrinology, as related to the female sex organs, might be of value at this time, together with the author's experience with some of these hormones.

Let us briefly review the normal physiology as developed in laboratory animals. It is generally believed that the pituitary gland is the so-called master gland of the body, and that most of the other glands of internal secretion are somewhat dependent upon it for stimulation. In this paper we will consider only the anterior lobe of the pituitary and its functions. It elaborates four main hormones, thyrotropic, parathyrotropic, adrenotropic, and gonadotropic. We will limit our discussion to the gonadotropic hormones, as these regulate ovarian function.

The function of the ovary is controlled by two distinct hormones elaborated by the anterior pituitary, the follicle stimulating, and the corpus luteum stimulating. The follicle in turn forms the estrogenic hormone, which causes regeneration of the endometrium and its growth into the so-called proliferative state of development, after which the follicle ruptures and ovulation takes place. The endometrium is greatly thickened and the glands become elongated. However, this hormone alone does not cause full development of the endometrium to the point where implantation of the fertilized ovum can occur. The effect of progesterone, which is elaborated from the corpus luteum, is needed to bring the endometrium to the premenstrual or secretory phase, preparing it for nidation of the fertilized ovum. If the ovum is not fertilized it dies, the corpus

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luteum degenerates, progesterone is withdrawn, and the endometrium breaks down and is expelled from the uterus with bleeding.

In derangements of the endocrine balance there may be various combinations. The follicle may not receive enough stimulation from the pituitary to become mature and rupture. If it fails to rupture, it continues its effects on the endometrium, and cystic degeneration occurs in the endometrium, functional bleeding takes place, and because it fails to ovulate no corpus luteum develops. Therefore, no progesterone is formed to carry the endometrium through to its pregravid stage. Breaks may occur anywhere along the line, and the hormones are used to attempt to repair these breaks.

We have for practical purposes four different hormones which react well in experimental animals and some of which are of value chinically. These four are: (1) follicle stimulating, (2) corpus luteum stimulating, (3) estrogenic, from the follicle, (4) progesterone, from the corpus luteum, the first two coming from the pituitary and the last two from the ovary. Estrin and progesterone do not stimulate the ovary at all; they only stimulate the endometrium. They are purely substitutive in character and not gonadotropic.

The follicle stimulating gonadotropic hormone is obtained from the pituitary gland of animals, and it has a very slight luteinizing effect also. While this preparation is effective when used on laboratory animals, the results in clinical work have been disappointing. The preparations are unstable and soon lose their potency[2]. Perhaps when a more potent preparation is available the results will improve.

The corpus luteum stimulating hormone is obtained from the urine of pregnant women. It also stimulates follicle development to a slight degree. This is called chorionic gonadotropic hormone because of the association with chorionic villi of pregnancy, where it is elaborated. This is available commercially as Antuitrin "S," Follutein, A. P. L., Antophysin, et cetera. It is an anterior pituitary-like substance and differs from that obtained from the pituitary gland. This hormone also, while it works well in animal experimentation, has a rather limited field of usefulness in practice, and results have varied widely in the hands of different workers.

Theoretically, it should be used in functional bleedings, particularly near puberty, in an attempt to stimulate corpus luteum formation, so that sufficient progesterone will be formed to carry the hyperplastic endometrium on to the premenstrual phase. According to Mazer and Goldstein, endometrial cystosis and hyperplasia always occur together. Abnormal bleeding occurs in advanced stages of hyperplasia when localized areas of necrosis and dilated veins are present in the superficial layers of the endrometrium. They believe that the hyperplasia is caused by a too long continued stimulation by the un-antagonized follicle or estrogenic hormone, rather than by an excessive amount, and that the absence of progesterone is the factor which permits the abnormal continuation of the action of the estrogenic hormone. Emil Novak[3] says that the most frequent variety of functional bleeding is that due to failure of rupture of the follicle with ovulation, and functional persistance of the unruptured follicle for a variable time.

These anterior pituitary-like substances have never been shown to have caused ovulation in the human. In my experience, the results obtained have been very disappointing in most cases, and have not been any better than those obtained by other means before the advent of these substances.

Equine gonadotropic chorionic hormone is obtained from the blood serum of pregnant mares. It is different from the two previous substances discussed; it contains both follicle stimulating and corpus luteum stimulating factors. It is the only hormone, with which I am familiar, which will cause maturation of the ovum and rupture of the follicle in the human.

The indication for its use is failure of ovulation, which is probably fairly common, and it must be remembered that the corpus luteum cannot develop unless ovulation occurs. Therefore, it should be useful in sterility due to failure of ovulation, and also in functional bleeding due to prolonged action of estrin on the endometrium, which in turn is caused by failure of ovulation and the failure of the corpus luteum to develop and control the action of estrin.

In my experience, this material is far superior to the other gonadotropic hormones. I have had two successes in sterility with this substance. They were both one-child sterilities of four and

five years, respectively. The tubes were patent and the menses fairly regular. The other hormones had been used intensively with no result. The material, Gonadogen, was given in one large dose of sixty units on the twelfth day of the cycle and pregnancy promptly ensued. One patient was delivered last month and the other is in her third month of a normal pregnancy. No endometrial biopsies were made in these cases, but they were probably instances of failure of ovulation. I have had fair success in a small series of cases of functional bleeding. I have discarded the other gonadotropic hormones almost entirely in favor of this material. The only drawback is the expense.

We now come to the two ovarian hormones, the follicle, or estrogenic, and the corpus luteum, or progesterone. They have no effect on the ovary itself; they are used clinically to make up for ovarian deficiency. Estrogen controls endometrial development, a deficiency prevents normal regeneration after menstruation, this hypoplasia may result in scanty menstruation or in amenorrhea. It also tends to counteract or inhibit the effect of the anterior pituitary hormone. It is probably the unapposed action of the anterior pituitary hormone, which causes the unpleasant symptoms of the menopause, and so the administration of estrogen gives symptomatic relief. It is most valuable for menopausal symptoms; it is also good in the treatment of gonorrheal vaginitis in children, and in senile vaginitis. It produces its effect in both instances by causing the vaginal mucosa to become thickened and cornified, approaching the adult type of mucosa found during sexual maturity, thus making it more resistant to infection and irritation.

Estrogenic hormone is probably harmful in functional bleeding due to hyperplasia and cystic degeneration. The lack of progesterone is the trouble here. It is valueless in amenorrhea unless there is a true endometrial hypoplasia present. An endometrial biopsy will determine this. Estrin combats uterine hypoplasia and renders the uterus receptive to whatever ovarian function remains, or may be induced by treatment with thyroid or gonadotropic substances, and so may be of value in sterility due to uterine hypoplasia.

There has been some mention in the literature of the danger of encouraging the development of carcinoma by long continued treatment with this hormone. Zondek[8] gave enormous doses up to 1,200,000 rat units to women over long periods, and is of the opinion that there is no danger of carcinoma. He produced great cystic hyperplasia and erosions of the cervix, but no carcinoma. Neither follicles nor corpus luteum developed, and no gonadotropic hormone was released from the pituitary. This also occurs during pregnancy. The large amounts of estrogen present during pregnancy is what prevents new follicles from developing, due to its inhibitory action on the anterior pituitary. Geist and Salmon[1] are also convinced of the freedom from danger of carcinoma.

At the present time there is great confusion in the matter of units of dosage. The international unit is a weight unit, and equals one-tenth of a microgram of estrone. There are several estrogens of different chemical composition and purity. It is thought by most workers that the estrogens should be measured by their effects on spayed rats rather than by weight, and they believe that the rat unit should be used. One rat unit of estrone equals five international units of estrone, but this proportion does not hold good in the case of estradiol and other estrogens of different chemical compositions.

It is estimated that the human female needs 500 Rat Units (2,500 International Units) as purely maintenance dosage, but where there has been a total lack of estrogen for some time, as in the castrate or menopausal woman, the minimal amount of estrogen which will cause the atrophic endometrium to proliferate is 50,000 Rat Units a month, or 1,750 daily for one month. Mazer and Israel[4] advise 10,000 Rat Units (50,000 International Units) every fourth day with gradual reduction of dosage. Often smaller doses will give symptomatic relief at the menopause.

Progesterone is used in the treatment of functional bleeding; it carries the hyperplastic endometrium over into the menstrual stage. It is purely substitutive and does not correct the ovarian dysfunction, which is responsible. It may well be combined with the A. P. L. chorionic gonadotropic hormone, or that from mares' serum. Before progesterone can produce its effect, the endometrium must have first been under the influence of estrogen.

Progesterone also tends to prevent uterine contractions induced by estrin or pituitrin, while estrin makes the uterus more susceptible to contractions induced by pituitrin. For this reason progesterone is valuable in early threatened abortion. I have had good results in this condition. It has been advocated in the treatment of pernicious vomiting and dysmenorrhea. I cannot report any specific cures in these conditions.

Before closing I would like to mention endometrial biopsies. There is no question but that this method is the scientific way to study the different phases of endometrial development and its response to hormone therapy. However, it needs a trained technician to prepare the slides and the procedure is not wholly without danger. Randall[7] has shown that the findings are not always conclusive, and that functional bleeding may occur in almost any phase of the endometrium. This has also been my experience. It probably has its greatest value in studies of sterility in an attempt to determine whether or not the patient ovulates. In a small experience with endometrial biopsies, I have not been greatly impressed with their practical value.

In conclusion: (1) In the author's experience from a clinical standpoint, the gonadotropic hormones obtained from the pituitary glands of animals and from the urine of pregnant women have been of very little value. (2) The gonadotropic hormones obtained from the urine of pregnant mares show great promise. (3) The estrogenic hormone is the most constant and dependable of all the hormones. (4) Endometrial biopsies have not enough practical value to justify the additional trouble, expense and slight danger involved in their use.

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DIETHYLSTILBOESTROL: A SYNTHETIC ESTROGENIC HORMONE

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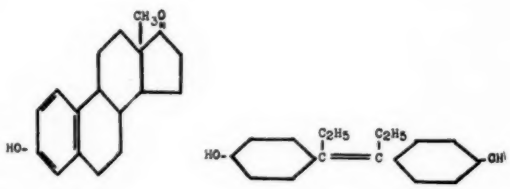
THE natural estrogenic hormones, estrone and estradiol, lose 95 per cent of their activity when administered orally. Estriol, also a natural occurring hormone, is more active orally than the other two, but at best is not a very effective substance. These estrogenic hormones together with the other sex hormones possess a pentenophenanthrene nucleus in their chemical structure.

In 1938 Dodds and his co-workers synthesized a substance that had the formula ($C_{18}H_{12}O_2$) 4:4 Dihydroxy Alpha: Beta Diethylstilbin, an entirely different chemical structure from the natural occurring hormone. This substance was found to be very active when administered orally and had the additional advantage of cheapness in manufacture.

Experimental studies on animals and humans showed that it was capable of producing all the biological effects of natural estrogens. It was active in producing proliferative changes in the endometrium; it caused withdrawal bleeding and



ESTRONE DIETHYLSTILBOESTROL

would reduce the excretion of gonadotropic hormones after castration.

Both in the human and in animal experimentation stilboestrol was found to have some very

definite side effects. In rats it produced epistaxis, vaginal and intestinal bleeding. It also produced fatty degeneration of the liver and enlargement of the adrenal gland. In doses of 0.5 to 1 mg. it produced death in mice, and in doses of 5 mg. daily for twenty-five to fifty days it caused disturbances in the myelogenic tissue in dogs. Although the toxic effects appeared to be very definite it must be remembered that the doses were proportionately larger than the amount of the substance used clinically.

TABLE I

Diagnosis	No. of Cases	Therapeutic Results			Treatment with Stilboestrol
		Excellent	Good	Poor*	
Menopause Spontaneous	20	10	3	7	0.1 mg. tid up to 2.0 mg. daily
Menopause X-Ray	1			1	1 mg. daily, 40 days
Menopause Surgical	4	3		1	1 mg. daily 20 – 40 days
Amenorrhea	2	1		1	3 mg. daily 30 days 1 mg. daily 20 days
Acromegaly	2		1	?	3 – 8 mg. daily Total 519 mg. in 5 months
Mastopathy	2	1	1		0.3 mg. daily 7 days
Diabetes Insipidus	1			1	1 mg. 2 days
Migraine	2	1	1		1 mg. daily 10 days
Total	34	16	6	12	

*Of the twelve patients included under poor results seven suffered with reactions and did not receive sufficient medication.

Considerable literature is now available reporting clinical studies. Several very severe reactions have been noted, but no fatal cases are on record. The toxic effects appear to be quite temporary. The percentage of unfavorable reactions vary greatly among the different investigators, the figures running from 3 to 60 per cent.

Most of the toxic reactions appear as nausea and vomiting, diarrhea, restlessness, skin eruptions, toxic psychosis, parethesias and thirst. Clinical studies have failed to show any definite evidence of renal, hepatic or myelogenic tissue changes. The reactions were often so slight that the administration of the hormone could be continued.

Stilboestrol has shown itself to be a very active estrogen when taken orally. It apparently is almost as active by mouth as it is by injection. It is fifteen to twenty times as active orally as estrone. However, it is only a fourth to a third as active intramuscularly as estradiol benzonate and much less active than the new partial synthetic estrogen ethinyl estradiol.

In all probability its oral activity depends on the inability of the liver to change or inactivate this substance in the manner in which the natural estrogens are altered. This inactivating mechanism in the liver is believed to be necessary to prevent a harmful accumulation of estrogens in the body. For that reason it is believed by some that the administration of an estrogen resistant to the liver may be deleterious.

This report is based on observations made in thirty-four cases in which stilboestrol was administered. In all cases careful urine, hemoglobin and leukocyte count determinations were made at intervals. No other laboratory tests were made, except that in some instances urinary sex hormone excretion studies were determined, but these values will not be included in this report.

The amount of diethylstilboestrol given varied greatly in the individual cases. In the menopause group, no patient received more than 2 mg. daily,

whereas the majority of these patients received one mg. daily. In several instances satisfactory results were achieved with 0.3 mg. a day.

TABLE II. REACTIONS TO MEDICATION

Group	Type of Reaction	No. of Cases	Percentage
I*	Severe reactions	7	20.6
II	Mild reactions	3	8.9
III	Reaction to oral, but not to hypodermic	1	2.9

*The reactions under Group I required cessation of medication. In cases under Groups II and III medication was continued.

Two young females with amenorrhea were observed. In one case 3 mg. daily for thirty days produced a rhythmic menstrual flow that lasted for four periods; the other patient received 1 mg. daily for twenty days with no effect. Diethylstilboestrol was given to two individuals with acromegaly with the hope that large amounts of estrogenic hormone would inhibit the pituitary activity. One patient received at various intervals 3 to 8 mg. a day over a period of five months, taking a total of 519 mg. The other patient with acromegaly was not followed long enough to make any observation that would be of value. Two cases of mastopathy in young girls who had most of their trouble around the menstrual period were given 0.1 of a mg. three times a day for seven days preceding the onset of the period. The single patient with diabetes insipidus after taking 1 mg. a day for two days developed a very unfavorable reaction and was forced to stop the medication. The two individuals with migraine that occurred around the menstrual period were given 1 mg. daily for ten days before the onset of the period.

It appears that in some cases there is a very definite relationship between the size of the dose and the development of disagreeable reactions, although several individuals developed unfavorable side effects on 0.3 mg. daily. It was noticed frequently that on raising the dose above 1 mg. a day the patient became nauseated, and on reducing the dose to one mg. or less a day the nausea disappeared. The majority of the patients, however, could take apparently any size of dose without any disturbance. In my group five patients had nausea, and in two of these it was severe enough to cause vomiting. Two patients had a peculiar full sensation in the head, and two others complained of lassitude. Three patients complained of tightness in the throat that caused a feeling of suffocation. This type of reaction, as far as I know, has not previously been reported.

The therapeutic results in the menopausal group as a whole appeared to be excellent, and those able to take a sufficient amount of the hormone had an improvement comparable to those who received an adequate amount of the natural estrogen by hypodermic injection. Of the twenty-five cases of menopause, sixteen were either completely or almost completely relieved of their symptoms. Of the nine cases grouped under the heading "poor results," four were unable to take a sufficient amount of the hormone and five did not improve even with a sufficient dosage.

Of the two cases of amenorrhea, one result was good with 3 mg. daily for thirty days; the other result was not good, but this patient received only 1 mg. daily for twenty days. This was probably due to an insufficient amount of the hormone. The middle-aged woman with acromegaly who received 519 mg. of stilboestrol in a period of five months had some very definite effects. The headaches were lessened, the voice was improved and the soft tissue and particularly the width of the nose was definitely improved. This result might be due to reducing the activity of the pituitary gland or to the feminizing influence of the hormone. The result was not sufficiently satisfactory to eliminate the necessity of further therapy of another type such as x-ray. The second patient with acromegaly was not followed long enough to form a definite opinion.

The two patients grouped under the heading of migraine had their attacks around the menstrual period and both were benefited considerably by the medication. In the group of spontaneous menopause there were also several who had migraine and who received benefit from this therapy.

A great deal has been written both for and against the clinical use of diethylstilboestrol. Its advantage, of course, lies in the fact that it is active orally, and, in my experience, dose for dose, it is as active orally as the natural hormones are by injection. It had, in my group, the disadvantage of producing in at least 20 per cent of the cases reactions so disagreeable to the pa-

tient that they would prefer to have their symptoms rather than medication. There is no good evidence that in the doses used clinically there occurred any permanent injury to the tissues of the body. Inasmuch as relatively small doses are often effective in relieving symptoms, and that the size of the dose is often responsible for the production of unfavorable by-effects, one should start with doses of not more than 0.1 mg. three times a day, gradually increasing this dose until either the desired effect is obtained or until the patient becomes uncomfortable from the medication.

It seems that where the cost of medication is important, and in those individuals who do not tolerate hypodermic injections, diethylstilboestrol offers a very valuable addition to our hormone therapy.

NOTE: Since the presentation of this paper before the Minnesota Society of Internal Medicine, in June, 1940, at Duluth, Minnesota, the number of cases treated with this preparation has been in the neighborhood of one hundred with essentially the same results. The diethylstilboestrol used in this study was furnished through the kindness of the Winthrop Chemical Company, Inc., and the Abbott Laboratories. No difference was noted between the preparations furnished by these two companies.

THE DIAGNOSIS OF PANCREATITIS*

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THE diagnosis of pancreatitis and, to a lesser extent, the diagnosis of malignant lesions of the pancreas have been a surgical rather than a medical problem. This is not a matter for wonder when one considers the sitution of the pancreas deep in the abdomen, its inaccessibility to palpation, the ability of diseases of the pancreas to mimic disease of other organs in the upper part of the abdomen, and the lack of accurate laboratory procedures for the diagnosis of pancreatic disease. However, this situation is undergoing a change, and the diagnosis of pancreatic disease pre-operatively is being made with increasing frequency. The change may be attributed to the development of laboratory methods of diagnosis and the increased awareness of pancreatic disease that the use of such tests has brought about.

Acute Pancreatitis

Interest in acute pancreatitis has been directed almost entirely to the more severe grades of the disease, such as pancreatic necrosis. The mild forms of acute pancreatitis have been ignored until the last few years. Pancreatic necrosis is a rare disease and important largely because of its high mortality. The mild degrees of pancreatitis, on the other hand, occur frequently and are important because of their effect on the postoperative convalescence, because they may terminate in pancreatic necrosis and because they may become chronic and produce persistent disturbances of pancreatic function. Both the mild and severe degrees of pancreatitis may be diagnosed pre-operatively if the condition is suspected clinically, if the clinical data are carefully weighed and if simple laboratory aids are utilized. Some of the problems involved in the diagnosis and the clinical and laboratory data useful in reaching a pre-operative diagnosis of acute pancreatitis are illustrated by the following case.

Case 1.—A woman, aged thirty-eight years, registered at the Mayo Clinic May 18, 1937. She stated that recurrent attacks of epigastric colic, severe enough to require morphine for relief, had begun in 1929. These attacks at first had occurred once every six months but recently they had occurred as often as every two months. A very severe attack associated with nausea, vomiting, chills, fever and jaundice had taken place in March, 1937. Minor attacks had occurred frequently since that time; a severe attack had begun four days prior to her registration at the Mayo Clinic.

Examination disclosed a slight icteric tint to the skin and sclera and slight tenderness and rigidity in the right upper quadrant of the abdomen. Urinalysis did not disclose any abnormality. The value for the hemoglobin was 13.8 gm. per 100 c.c. of blood. The leukocyte count was 15,700 per cubic millimeter of blood and 93.5 per cent of the leukocytes were neutrophils. The concentration of bilirubin in the serum was 1.6 mg. per 100 c.c. and the van den Bergh reaction was direct. The activity of lipase in the serum, expressed in terms of cubic centimeters of twentieth-

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read at the meeting of the Southern Minnesota Medical Association, Red Wing, Minnesota, September 23, 1940.

normal solution of sodium hydroxide, was 5.3. The value for the serum amylase was 1,500 units. The diagnosis was chronic cholecystitis with stones, acute pancreatitis and possibly a stone in the common bile duct. Exploratory laparotomy, which was performed on May 21, 1937, confirmed the clinical diagnosis of cholecystitis, gallstones and acute pancreatitis. Cholecystectomy was performed for subacute cholecystitis with cholelithiasis. The pancreatitis was graded 2, on the basis of 1 to 4, by the surgeon. Exploratory choledochostomy did not disclose stones and the scoop could be passed through the lower end of the common bile duct and into the duodenum without encountering resistance.

Acute pancreatitis or some complication of cholecystic disease such as pancreatitis may be suspected when an attack of biliary pain is prolonged, when the attack recurs frequently, if not daily and is associated with persisting tenderness in the right upper quadrant of the abdomen and in the epigastrium. Pancreatitis may also be suspected when the pain is not relieved by the administration of morphine. Pancreatitis is almost certain to be present when the pain and tenderness spread to or involve the left side of the epigastrium and especially so if the pain extends to and tenderness develops in the left subcapsular region. In case 1 it was the frequently repeated attacks of pain which suggested the possibility of acute pancreatitis and led to the determination of the concentrations of amylase and lipase in the blood serum. The presence of a stone in the common bile duct was suggested by the history of jaundice which in this case must have been due either to cholangitis or an associated hepatitis.

The diagnosis of acute pancreatitis may be established with great accuracy by the determination of values for lipase and amylase in the serum.[4,5,6] These values rise above the normal of 1.5 c.c. of twentieth-normal solution of sodium hydroxide for lipase in the serum and 320 units for amylase in the serum within a few hours after the onset of the acute episode. The maximal increase is reached within twelve to twenty-four hours and the values then decline. The value for the amylase usually reaches normal within three to four days and that for lipase usually becomes normal in seven to fourteen days. If positive findings are to be expected with any great regularity, values must be determined early in the course of the disease. The concentration of lipase in the serum has so far been accurate in pointing to the presence or absence of active pancreatic inflammation in 99 per cent of cases and the concentration of amylase has been an accurate indication of the condition of the pancreas in 87 per cent of cases in which it has been possible to determine the status of the pancreas in the light of both clinical data and the description of the pancreas as given by the surgeon.[1] The values for amylase and lipase in the serum will be elevated in the more severe degrees of acute pancreatitis (pancreatic necrosis) so long as functioning pancreatic tissue remains.

Disturbances of carbohydrate metabolism occur in cases of acute pancreatitis but are usually transitory. Glycosuria has been reported in from 5 to 20 per cent of cases.[2,8,9,10] Hyperglycemia has been reported in from 50 to 100 per cent of cases[3,7,10] but because this condition also occurs in association with other acute diseases of the upper part of the abdomen and with coronary thrombosis, a concentration of less than 175 mg. of sugar per 100 c.c. of blood should be interpreted with a great deal of caution. If pre-existing diabetes can be excluded, glycosuria and hyperglycemia should point definitely to inflammatory disease of the pancreas if found during attacks of pain in the upper part of the abdomen. Tests for tolerance for dextrose may sometimes need to be performed in order to demonstrate the milder degrees of dysfunction of the islands of Langerhans which occur as a result of acute pancreatic inflammation.

Disturbances of the external secretion of the pancreas sometimes persist after disturbances of internal secretion have disappeared. They may be detected by study of the duodenal contents after stimulation with either secretin or mecholyl (acetyl-beta-methylcholine chloride). These methods of study will be considered subsequently.

Chronic Pancreatitis

Chronic pancreatitis to most physicians has usually meant the combination of steatorrhea and diabetes mellitus but these manifestations usually occur when the pancreatitis is severe. In cases in which the disease is mild it must be recognized by manifestations that are less marked than steatorrhea and diabetes mellitus. In its early stages chronic pancreatitis is manifested by repeated attacks of epigastric pain and tenderness, by disturbance of the motility of the stomach and intestine, and by jaundice produced by

pressure of the swollen head of the pancreas on the common bile duct. In cases in which the pancreatitis is severe, diabetes mellitus, diarrhea (either with or without steatorrhea), pancreatic calcification, fatty metamorphosis of the liver, hepatic decompensation with ascites may develop and loss of weight and even emaciation may occur. Chronic pancreatitis may or may not be associated with disease of the biliary tract. Chronic pancreatitis secondary to disease of the biliary tract may be suspected when disturbance of pancreatic function occurs during the course of cholecystic disease and whenever repeated attacks of colic occur following cholecystectomy.

Case 2.—A woman, aged forty-five years, registered at the Mayo Clinic July 16, 1934. In 1917 appendectomy and cholecystostomy had been performed for attacks of epigastric pain typical of biliary colic. In 1918 cholecystectomy had been necessary for relief of pain. In 1920, epigastric distress and pain, which usually had been induced by fat and fried foods, again had been noticed. The pain had been mild until eight months prior to her registration. During the eight months, the pain had become more severe and the patient had had five attacks of epigastric colic severe enough to require hypodermic injections of morphine for relief. The stools had been acholic during the attacks. The results of physical examination were essentially negative. Roentgenograms of the spinal column and stomach did not disclose any abnormality. The bromsulfalein test of hepatic function did not disclose any retention of dye. The concentration of bilirubin in the serum was 1.0 mg. per 100 c.c. and the van den Berg reaction was indirect. The activity of lipase in the serum in terms of twentieth-normal solution of sodium hydroxide was 1.7 c.c.

The diagnosis was not clear-cut; however, it was thought that cholangitis or a stone in the common bile duct was the most probable cause of the symptoms. The diagnosis of pancreatitis was considered. On July 27, 1934, exploratory laparotomy was carried out. The common bile duct was found to be 2 cm. in diameter but its walls were not thickened and were normal in color. The duct was opened and obstruction was met with in the region of the sphincter of Oddi and in the region of the pancreatic portion of the duct. Scoops were passed through the ampulla into the duodenum with difficulty. The pancreas itself was enlarged and nodular, and severe pancreatitis was present. A T tube was inserted in the common bile duct and left in place for three months. On August 19, 1934, cholangiography revealed the constriction of the common bile duct at its point of entrance into the duodenum. Ninety per cent relief of symptoms was obtained.

The diagnosis of pancreatitis was not made pre-operatively in this case. Pancreatitis was suspected, however, with stone in the common bile duct and stone in the stump of the cystic duct because of the history of recurring colic after cholecystectomy. Clinical manifestations did not point clearly to pancreatic disease; the value for the serum lipase was slightly elevated but this finding was ignored because of the small degree of elevation and because the test was new at that time and its reliability had not been established.

Pancreatitis unassociated with disease of the gall bladder or bile ducts is illustrated by the following case.

Case 3.—A man, aged fifty-six years, registered at the clinic August 5, 1940. He had been perfectly well until April 1, 1940. Severe, almost constant, pain and severe tenderness had been present in the right upper quadrant of the abdomen almost constantly from April 1 to 10. The severity of the pain had decreased but distress had occurred almost daily. The distress had seemed to spread to the left upper quadrant of the abdomen and across the back at the level of the costovertebral angles. It had been intensified by meals, particularly by heavy meals eaten at noon or at night. Urinalysis had not revealed any abnormality. On May 1, the daily number of stools had increased from three to five. Defecation usually had occurred with marked urgency about fifteen minutes after meals. After defecation the patient had observed droplets of fat floating on the water in the toilet. Another severe attack of pain had occurred on July 1. At this time the pain had been situated in the left upper quadrant of the abdomen. The pain had lasted for several days and had been associated with marked soreness; it had been followed by polyuria, polydipsia and polyphagia. His weight had decreased from 145 pounds (65.8 kg.) to 112 pounds (50.8 kg.).

Physical examination at the clinic disclosed that the liver could be palpated about 8 cm. below the costal margin on inspiration. The reaction of the urine was acid and the specific gravity was 1.035. Glycosuria was present; the urine contained 6 per cent of sugar. Acetone and diacetic acid were not present in the urine. Examination of the blood revealed that the concentration of hemoglobin was 13.5 gm. per 100 c.c. The leukocyte count was 12,700 per cubic millimeter. The concentration of sugar in the blood was 265 mg. per 100 c.c. The results of routine serologic tests for syphilis were negative. Analysis of the gastric contents revealed that the values for the total acidity and the free hydrochloric acid were 34 and 20 respectively according to the method of Töpfer. Examination of the stools revealed an excess of oil or fat. Roentgenologic examination of the thorax, gall bladder, stomach, terminal portion of the ileum, and the colon did not disclose any abnormality.

The patient was admitted to the hospital on August 10. His temperature and pulse rate remained normal. Further study of the blood including mor-

phologic study of the erythrocytes, did not disclose any abnormality. The concentration of bilirubin in the serum was 1.3 mg. per 100 c.c. and the van den Bergh reaction was indirect. The bromosulfalein test for liver function revealed retention of dye, grade 1. The concentrations of amylase and lipase were 106 units and 0.1 c.c. of twentieth-normal solution of sodium hydroxide, respectively. Fat made up 60.4 per cent of the dried stools. Studies of the external pancreatic secretion after stimulation with secretin showed marked diminution in the secretion of fluid, carbonate and the enzymes, amylase, trypsin and lipase.

He was given a diet containing 346 gm. of carbohydrate, 105 gm. of protein and 54 gm. of fat, in order to control the diarrhea. Glycosuria persisted in spite of the administration of 6 units of protamine insulin and 10 to 24 units of regular insulin daily.

The diagnosis was chronic pancreatitis and a disturbance of the internal and external secretions of the pancreas (diabetes mellitus and steatorrhea). Exploratory laparotomy was performed August 23. The head of the pancreas was found to be two or three times its normal size and to be the site of brawny induration; the body and tail of the pancreas were cylindrical. The organ was approximately 3.5 cm. in diameter, and its length was normal. The gallbladder and common bile duct were distended; however, the wall of the gall bladder was normal in color. The gall bladder was incised but no stones were found. Cholecystostomy was performed and a tube was inserted into the gall bladder. The liver appeared to be in normal condition.

The diabetes improved markedly and at the time of the patient's dismissal from the hospital on September 10 he was taking only 6 units of protamine insulin daily and his diet contained 346 gm. of carbohydrate, 145 gm. of protein and 69 gm. of fat. Glycosuria was not present and the concentration of blood sugar was 125 mg. per 100 c.c. on August 30. He was returned to his home on September 13 and was instructed to increase the intake of fat if there was no further trouble with diarrhea.

In this case the gall bladder, stomach and colon were excluded roentgenologically as the site of the disease process. The site of the pain and tenderness in the left upper quadrant of the abdomen, as well as the development of steatorrhea following the first attack and diabetes mellitus following the second acute attack, pointed with certainty to the diagnosis of pancreatic disease. Various laboratory studies proved that disturbance of pancreatic function was widespread.

In cases of chronic pancreatitis, elevations in the concentrations of lipase and amylase in the serum may persist between attacks and long after major and minor attacks have ceased. The concentration of amylase rarely is increased for prolonged periods. In this case, five weeks had passed since the last really severe attack and the values for amylase and lipase in the serum had returned to normal. Disturbances of carbohydrate metabolism may not be so marked as in this case and sometimes may be detected only by a diabetic type of blood sugar curve following the administration of dextrose. A very significant point about the diabetes in this case was its absence in the early stages and its development in the later stages of the disease. Study of the external pancreatic secretion may alone demonstrate that pancreatic disease is the cause of the attacks of pain after the acute inflammation has ceased. The duodenal contents are quantitatively collected after stimulation with either purified secretin or mecholyl.[5,6] Secretin is administered in doses of 1 clinical unit per kilogram of body weight. Fifteen milligrams of mecholyl administered subcutaneously stimulates external pancreatic secretion satisfactorily. The duodenal contents are most accurately removed by continuous suction through the double-barreled gastroduodenal tube devised by Agren and Lagerlöf.[1] By means of one barrel of this tube the gastric contents can be aspirated and thus prevented from entering the duodenal cavity and confusing the results of analysis of the duodenal contents. A negative pressure of 16 inches (40.6 cm.) of water has been found satisfactory. The duodenal contents are measured in cubic centimeters and the concentration and total secretion of carbonate and of amylase, lipase and trypsin per unit of time are determined and compared with values obtained for normal individuals. The importance of measuring the volume of duodenal contents obtained and of determining the total secretion of enzymes (concentration per cubic centimeter multiplied by the number of cubic centimeters of duodenal content obtained per unit of time) as well as the concentration of enzymes is well illustrated by data obtained in a case of chronic pancreatitis and shown in Figures 1 and 2. The low concentration of trypsin cannot be interpreted to mean diminished secretion of trypsin, for the total secretion per unit of time shows that trypsin is being secreted in amounts above normal. In Case 3 all of the fractions of the external secretion of the pancreas were disturbed. In some cases, however, secretion of amylase alone may be disturbed and this probably represents the

mildest degree of pancreatic injury. The decrease in the volume of duodenal contents and in the carbonate content seem to occur in the ease in the pancreas. According to Thaysen, only when 35 to 40 per cent or more of ingested fat is lost as neutral fat does a form of steator-

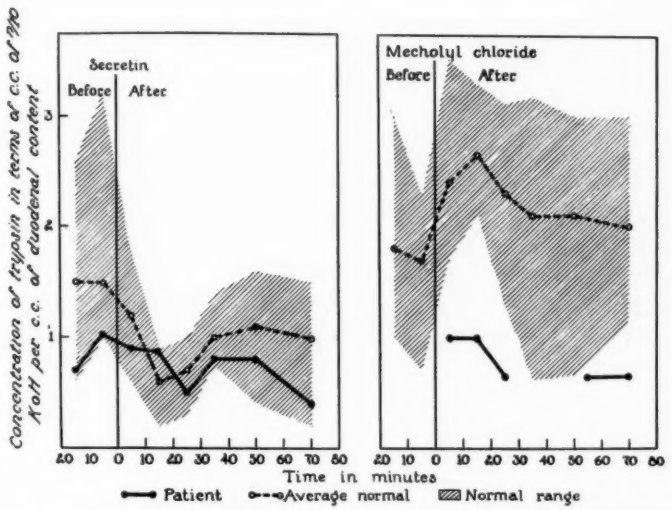

Fig. 1. The concentration of trypsin in the duodenal contents in a case of chronic pancreatitis is compared with the concentration in the duodenal contents of normal persons. The concentration of trypsin after stimulation with secretin in this case appears in the lower range of values found for normal persons but is definitely below this range after stimulation with mecholyl. The low concentrations do not mean abnormally low secretion but are due to the diluting effect of hypersecretion of fluid by the pancreas.

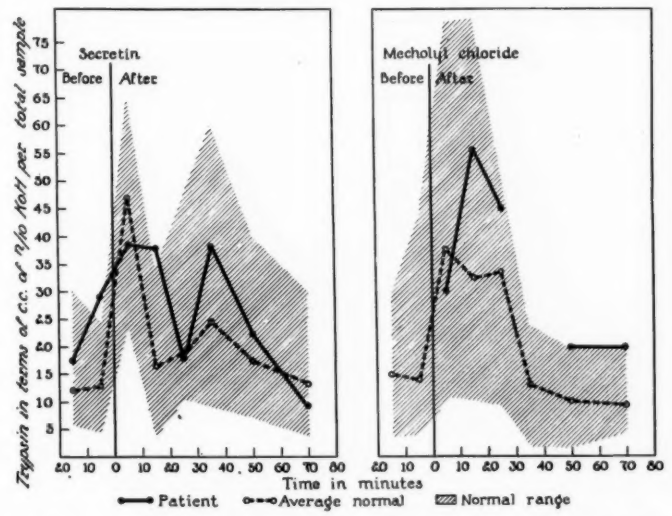

Fig. 2. The total secretion of trypsin in a case of chronic pancreatitis is compared with the total secretion of trypsin per unit of time by normal persons. A secretion of trypsin is seen after stimulation with both secretin and mecholyl in spite of the low concentrations of trypsin.

more extensive degrees of pancreatic disease.

Examination of the stools for food seldom furnishes information that will localize the disrhea diagnostic of pancreatic disease exist. According to the same author, the loss of more than 3 gm. of nitrogen in the stools per day

will probably distinguish the steatorrhea of pancreatitis from that due to diseases of absorption, such as sprue.

Among the mechanical effects of pancreatitis

Fig. 3. Roentgenogram showing extensive calcification of the head and body of the pancreas.

may be mentioned obstruction of the common bile duct with obstructive jaundice and disturbances of motility of the stomach and small and large intestines. The obstruction of the common bile duct may sometimes be demonstrated, as in Case 2, by cholangiography. Hypomotility of the gastro-intestinal tract may be marked. Retention of barium in the stomach for as long as twenty-four hours has been noted, as well as marked hypomotility of the bowel. The hypomotility at times may be due to actual ileus, which often is localized, and may lead to the erroneous diagnosis of intestinal obstruction. Pancreatic calcification (Fig. 3) may be demonstrated by special roentgenograms of the pancreas; when present it is bona fide evidence of previous or existing chronic pancreatitis. Fatty metamorphosis of the liver may be detected by the bromsulfalein test.

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EXTRAPLEURAL PNEUMOTHORAX*

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IN the treatment of pulmonary tuberculosis the extensive use of collapse therapy has been the major factor in improving the prognosis of patients entering the sanatorium with advanced and destructive lesions. Extrapleural pneumothorax has recently been added to the various surgical procedures used to collapse diseased lung in cases where intrapleural pneumothorax could not be induced. This procedure consists of stripping the lung, together with both layers of pleura, from the thoracic wall and mediastinum, thereby creating a space which is maintained by air injections. The purpose of this paper is to present the results of our small series of cases, to discuss the complications encountered, to describe the operative procedure and aftercare, and to give our impression of the value of this addition to collapse therapy.

Interest in this procedure was initiated by the report of the experiences at the Brompton Hospital for Diseases of the Chest, made by Belsey at

*Revision of original paper presented at meeting of Minnesota Trudeau Medical Society at Duluth, Minnesota, August 24, 1940 to include data to March 1, 1941.

the meeting of the American Association for Thoracic Surgery at Atlanta, Georgia, in 1938, and the interesting discussions following his paper. It was further stimulated by the reports of Overholt and Tubbs, and others which appeared in the literature shortly after this. We have been favorably impressed by Dr. Kinsella's results with the procedure of extrapleural pneumonolysis with the insertion of a paraffin pack. The use of paraffin, however, is limited to relatively small apical lesions. It seemed to us that a successful extrapleural pneumothorax might be the best way of arresting disease and closing cavities in cases in which thoracoplasty would be contraindicated due to extensive or recent involvement of the contralateral lung and in cases too toxic to consider risks for multiple stage thoracoplasty.

The first case of extrapleural pneumonolysis, with subsequent extrapleural pneumothorax, was performed at Nopeming in March 1939. Immediately thereafter, it was my privilege to spend a few days at Madison, Wisconsin, and at the Wisconsin State Sanatorium at Wales, where the results of a series of over fifty cases operated by Dr. Gale were impressive and influenced us in the selection of a small series of cases for this procedure. During the spring of 1939 we operated upon seven additional patients, thereafter waiting 10 months before adding any more cases to our series. In the two years since the first operation was performed at Nopeming Sanatorium, extrapleural pneumonolysis for the production of extrapleural pneumothorax has been done twenty-two times on twenty patients. In addition, the procedure was attempted but abandoned in three cases in which extreme inflammatory reaction made adequate stripping impossible. Bilateral pneumothorax was established in one case, later converted to bilateral extrapleural oleothorax and in one case a secondary pneumonolysis was performed to increase the collapse of the original pneumothorax. We have tried to make this series include as wide a variety of indications as possible from the standpoint of involvement of the lung, toxemia, and other considerations. During this time we have formed certain impressions which will be discussed later in this paper.

In our series of cases, three patients were operated under general inhalation anesthesia (cyclopropane); a combination of local supplemented by inhalation anesthesia was used in eight patients; eight patients were operated under local infiltration anesthesia exclusively; and in the last four consecutive cases intravenous anesthesia (pentothal sodium) was used together with intratracheal administration of oxygen. In one half of the group in which local anesthesia was used, it was necessary to supplement with inhalation anesthesia to completely control pain or cough occurring when the pleura was stripped from the mediastinal structures. Intravenous anesthesia with oxygen inhalation appeals to us as the most satisfactory method for this procedure.

Briefly, the operative procedure for the production of an extrapleural pneumothorax for an apical lesion is similar to that of an upper posterior stage thoracoplasty from the standpoint of surgical approach, duration of the procedure, and the postoperative reaction of the patient. The patient's position is the same as that used for an upper posterior thoracoplasty. The incision is similar but not as extensive in order to reach the costal bed. A segment of the third, fourth, or fifth rib is removed from the posterior angle laterally for a distance of about 10 cm., particular care being taken to strip the periosteum with as little damage as possible and to trim the resulting rib stumps so as to remove all of the rib from which the periosteum has been stripped. Through an incision in the periosteal bed, the extrapleural space is developed by separating the parietal pleura from the endothoracic fascia. The parietal pleura can be peeled along this plane without great difficulty as a rule. Most of the stripping is done with the finger or by careful dissection with a small gauze pledget on the end of a forceps. Occasionally areas of denser adherence may require sharp dissection, but by patient and careful freeing of the lung around these areas, they frequently can be peeled off with the gauze dissecter. The lung is usually freed posteriorly as far as the seventh rib, and anteriorly as far as the second rib, though the lysis may be more or less extensive depending, of course, upon the underlying pathology. It is extremely important that the apex be freed and that the stripping be carried down along the mediastinum below the arch of the aorta on the left and to the azygos vein on the right. Failure to free the apex completely may result in hung, slit-like cavities which remain patent. Bleeding encountered is usually

controlled by packing, though small arteries may be opened which require the use of silver neural clips for hemostasis. This occurs more frequently when the extrafascial plane is accidently entered during the dissection. It is not unusual to inadvertently lose the extrapleural plane and enter either into the extrafascial or into the intrapleural space.

I believe that it is always wise to free more of the lung than one feels is necessary to control the disease, as it is only too easy to allow the lung to re-expand. When sufficient lysis has been performed, the extrapleural space is washed out with normal saline and inspected for persistent bleeders, following which closure is made by continuous suture, using fine chromic gut to close the periosteal incision followed by an overlapping of the intercostal muscle from above and below the resected rib segment. The usual thoracoplasty closure completes the operation. In a few cases we filled the extrapleural space with normal saline solution before closure with the idea of making the first aspiration easier, but have since abandoned this procedure. With one exception, the average duration of the surgical procedure was 2 hours.

The morning following operation, a pneumothorax apparatus is brought to the patient's bedside and a needle is inserted into the extrapleural space via the first interspace, usually in the anterior axillary line. Manometric readings are taken, and enough air is injected to bring the pressures to approximately plus 10 cm. of water. On the second postoperative day the patient is fluoroscoped and brought to the operating room for aspiration and irrigation of the extrapleural space. The needle is inserted in the paravertebral region high in the thoracic cage. Thorough aspiration of the extrapleural space is accomplished without requiring much coöperation from the patient by using the Trendelenburg position and lateral tilt in order to have the fluid gravitate towards the apex where the needle has been inserted. I feel this is safer than attempting to tap the space near the lower border of the lysis where there is a possibility of lung puncture. The fluid, which is quite bloody, is aspirated and the space thoroughly irrigated with normal saline. If bleeding is found to be more than usual, it has been my habit to leave 200 or 300 c.c. of saline in the space, following which the pressures are again adjusted to a maximum positive of approximately 10 cm. of water. In the uncomplicated cases, we have aspirated approximately every other day until the space is dry. In this group the average number of aspirations required has been between three and four.

The reaction of the patient towards the surgical procedure is very similar to that of an upper posterior stage thoracoplasty. With the exception of three cases, the postoperative shock was estimated as slight to moderate. In the series of twenty-two operations, eleven intravenous infusions of saline were given; no transfusions were necessary; and oxygen was not required in any case. The blood pressure usually drops following operation for a matter of a few hours, rapidly returning towards normal. By the next morning the patient is usually able to eat breakfast and is quite comfortable. The duration of temperature and pulse elevation following operation in the uncomplicated cases averaged less than a week.

The success of the extrapleural pneumothorax is dependent more upon proper aftercare than on the surgical procedure itself. For this reason I believe the procedure will only be popular when carried out in a tuberculosis sanatorium or at least where the medical staff is thoroughly familiar with the treatment of complications of pneumothorax. I sincerely believe that the majority of the complications which we encountered would have been prevented if we had started out with the experience which we have since gained in handling this small number of cases. It is significant that six of the nine patients who had any complications whatsoever were in the first group of eight patients operated upon. It is to be realized that every extrapleural pneumothorax starts out complicated with a bloody effusion which later on becomes serous and which is an ideal culture for any contaminant organisms. For this reason vigorous treatment towards the removal of all bloody effusion with the object of obtaining a dry space as soon as possible must be pursued. Aspiration of the bloody effusion alone without thorough irrigation with saline until the fluid returns clear invites the development of postoperative empyema. For the same reason, extreme care should be taken to prevent any possible puncture of the underlying lung. When one follows aspiration of the effusion with thorough irrigation with normal saline, it is not

necessary to thoroughly dry the pleural space as small amounts of normal saline are quickly absorbed in the extrapleural space, leaving a dry pneumothorax. The importance of the saline irrigation has not to my knowledge been stressed in the articles written on this subject. In fact, the postoperative care of the collapsed lung has been passed over rather lightly by most of the writers. Possibly this is due to the fact that the articles have been written by the surgeons who have been overly impressed by the value of their particular part in the procedure, in other words the extrapleural pneumonolysis, and have not realized that the success or failure of the extrapleural pneumothorax has often been due to the judgement and hard work of the staff man in establishing the actual collapse.

In the beginning we tried to follow the advice of the writers regarding pressures. Many of them advocated rapid conversion of the pneumothorax to a high positive pressure type, using pressures of from plus 30 to plus 50 cm. of water. In an early group of patients we tried this method and ran into difficulties. We have since held our pressures down to a maximum of about 10 cm. during the first few weeks of the collapse therapy, later on in some cases increasing the pressures to a maximum of plus 30 cm. of water. We have found that the use of higher pressures is unnecessary, especially if one starts out with a pneumonolysis which has been more than adequate for the disease involved. With this margin to work with, one can allow the lung to gradually re-expand under daily fluoroscopic control during the first few weeks until one considers that the collapse is proper, only then increasing the pressures if necessary. This method is accompanied by practically no complications. If it is impossible to hold the amount of collapse desired, I am of the opinion that conversion to oleothorax is indicated, as this appeals to me as being a more logical procedure than subjecting the collapse to wide variations in pressure, and thereby inviting the return of effusion. We have used oleothorax in order to maintain a collapse in the presence of obliterative pleuritis in intrapleural pneumothorax and have yet to find a reason for considering this treatment unsafe.

For the first six to eight weeks following operation frequent refills should be given, at least twice a week, always preceded by fluoroscopic study. After this period of time, the usual extrapleural pneumothorax becomes well established and the interval of refills can be extended. Following several months of collapse, only small amounts of air are required, and we have found that it is safe to stretch the interval in some cases to as much as three weeks between refills. We have converted seven of the group to oleothorax. This is a very satisfactory procedure for permanently maintaining collapse of the pathology and frees the patient of the necessity of returning for frequent refills.

In the following analysis of this series the complications encountered will be particularly stressed as well as presenting a description of the type of case selected for the procedure and the results following the establishment of extrapleural pneumothorax. From the standpoint of age and sex this group is similar to any group of candidates for thoracoplasty. It consisted of nine women and eleven men, ages ranging from twenty-one to forty-seven. Table I is an attempt to classify the results by the patient's condition, dividing them into three groups according to the condition of the contralateral lung.

TABLE I. EXTRAPLEURAL PNEUMOTHORAX

	Number	Results
CONTRALATERAL LUNG NEGATIVE OR MINIMAL INACTIVE	*6*	
F.A. pneumonic with cavity	1	Dead
Collapsed lung M.A. with cavity	4	Satisfactory
Minimal progressive	1	Satisfactory
CONTRALATERAL LUNG EXTENSIVE QUIESCENT OR RETROGRESSIVE LESION	*12*	
M.A. with cavity	4	Satisfactory
F.A. with cavity	*7*	Satisfactory
F.A. with cavity	1	Unimproved
CONTRALATERAL LUNG PROGRESSIVE LESION	*2*	
F.A. with cavity	1	Dead
Collapsed lung M.A. with cavity	1	Satisfactory

*F.A. stands for "far advanced" and M.A. for "moderately advanced."

It will be noted that in twelve patients the contralateral lung was involved by an extensive quiescent or retrogressive lesion which was the main indication for this procedure rather than thoracoplasty. Two of these patients each had two operations, one having a bilateral extrapleural pneumothorax later converted to bilateral

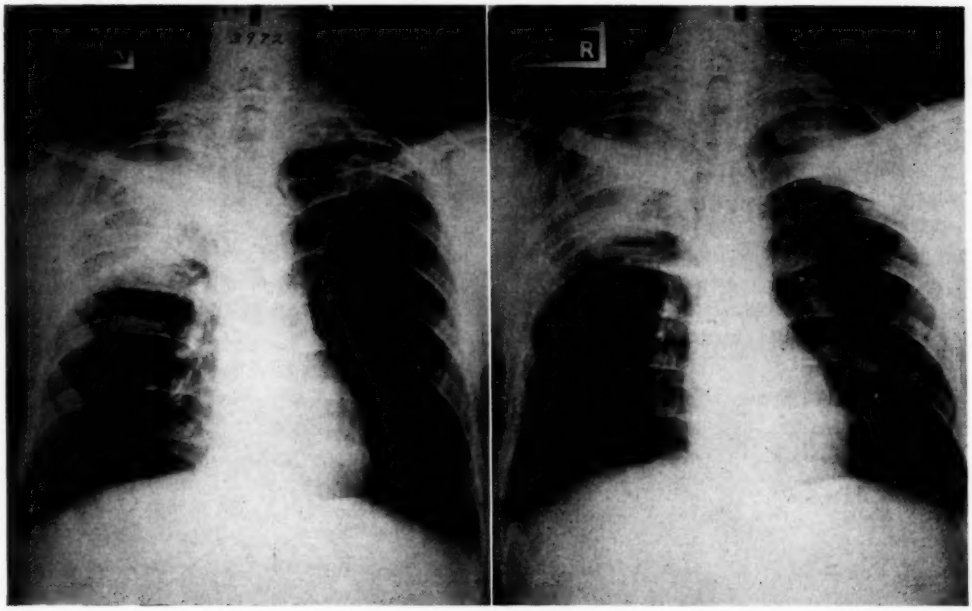

Fig. 1. Roentgenograms before and after bilateral extrapleural oleothorax. The cavity in the apex of the contralateral lung developed six months following the pneumonolysis done on the right side. Maximum functioning of uninvolved lung maintained on both sides.

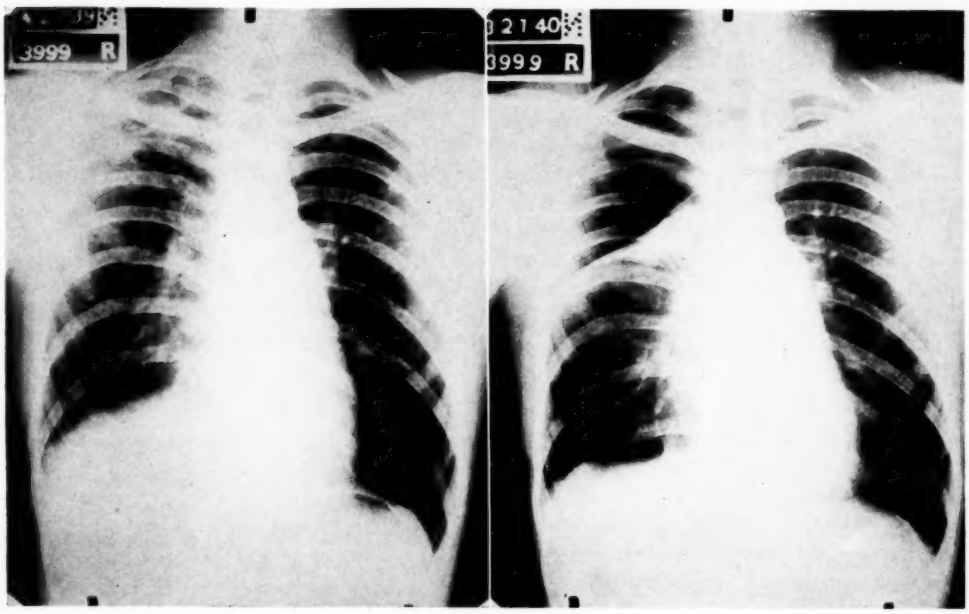

Fig. 2. Roentgenograms before and after the establishment of an extrapleural pneumothorax on the right side with a recent progressive lesion in the midportion of the left lung. Closure of cavity, conversion of sputum, as well as clearing of the contralateral lesion resulted.

oleothorax (Fig. 1) and the other had a secondary pneumonolysis in order to increase the size of her pneumothorax. This group also includes the two cases in which bronchopleural fistula occurred, one having a subsequent thoracoplasty with eventual satisfactory results. The other, now being treated by intercostal catheter drainage and classified as unimproved, is now being prepared for thoracoplasty.

Two of the series had progressive lesions in the contralateral lung at the time of operation. Of these, one died postoperatively of bronchopneumonia and in the other (Fig. 2) the result is satisfactory with subsequent improvement of the contralateral lesion. The remaining group of six had essentially negative contralateral lungs. In one the operated lung was involved with an advanced pneumonic infiltration throughout the upper lobe with cavitation. The remaining five, in whom all the results were satisfactory, might have been subjected to thoracoplasty. Three were young women with progressive lesions limited to the upper lobe which failed to stabilize on bed rest alone. Extrapleural pneumothorax was selected rather than thoracoplasty as the less radical of the two procedures. Extrapleural pneumothorax was chosen in the remaining two who had lesions with cavity involving only a small portion of the apex. Less good lung was sacrificed to control the pathology than would have been had thoracoplasty been the procedure used.

Table II is a list of the complications occurring in our group together with treatment and results.

While complications occurred following extrapleural pneumonolysis in nine patients they were of a serious nature in only five cases, causing death in two patients. The low grade empyema listed was easily controlled by oleothorax and did not affect the final results. Thirteen operations performed on the remaining eleven patients were attended by no complications.

Table III summarizes the results of the series as a whole.

TABLE II. EXTRAPLEURAL PNEUMOTHORAX

Cases	Complications	Treatment	Result
1	Empyema with contralateral spread	Irrigations	Dead
1	Postoperative pneumonia	Oxygen therapy	Dead
2	Bronchopleural fistula	1 Thoracoplasty 1 Intercostal drainage	Satisfactory Unimproved
1	Mediastinitis with loss of air space	Irrigations	Satisfactory
4	Empyema (low grade)	Oleothorax	Satisfactory

TABLE III. EXTRAPLEURAL PNEUMOTHORAX

	No. Patients
Satisfactory	16
Thoracoplasty required	1
Unimproved	2
Dead	2

The sixteen patients in the first group include one having a bilateral extrapleural pneumothorax and one having a subsequent lysis to increase the collapse of the original pneumothorax, making a total of eighteen operations. The case listed as unimproved is to be submitted to thoracoplasty in the near future in the hope of improving his status. The relatively high mortality is due to the application of this procedure to a group of patients including many who would be considered too poor a risk for thoracoplasty.

Discussion

While our series of cases is too small and our experience too short to warrant definite conclusions regarding the procedure of extrapleural pneumothorax, we have been impressed with the value of this procedure. In the hands of men trained in pneumothorax therapy, popularity of this procedure is bound to increase. Too much emphasis cannot be placed on the proper postoperative care of the collapsed lung. No other surgical procedure, with the exception of paraffin pack, can produce as efficient anatomical collapse of the disease with such a minimum loss of functioning lung, and it has its advantage over the paraffin pack in that the extent of collapse is not limited. The operation itself was withstood well by the patients and can be tolerated even by

those in whom toxemia is marked. The rapid collapse of the pathology resulting from the procedure seems to have no appreciable effect on the patient's condition. The reaction of the patient is not greater than that following an upper posterior stage thoracoplasty.

One of the most gratifying features of this procedure has been the rapid conversion of sputum. In fourteen of the eighteen surviving cases all specimens of sputum examined following establishment of pneumothorax have failed to reveal tubercle bacilli. These examinations have consisted of 24-hour specimens which had been concentrated in the usual way before being examined for the bacilli. Of the remaining four, one became negative two months following surgery; another, in which a bronchopleural fistula developed, remained positive until thoracoplasty was done seven months later. Of the remaining two, both operated upon within the past two months, one has cavitation in the contralateral lung, and in the other the cavity under the pneumothorax is still patent.

The complications following this procedure will be reduced, we are sure, with proper postoperative treatment. Empyema occurring is not usually as serious as in intrapleural pneumothorax and can be controlled by irrigation through the acute stage, followed by oleothorax. Bronchopleural fistula is the most serious complication of this procedure. While it has been felt that giant cavities with thin walls are very likely to necrose due to disturbance of circulation, the experience of Proctor and others has been that this does not generally occur.

When permanent collapse of the pathology is desired, it seems practical to us to convert the extrapleural space to an oleothorax. We have used this method for maintaining collapse in intrapleural pneumothorax where obliterative pleuritis has occurred and, after five years' experience, we have found no reason to discontinue it. We feel that extrapleural pneumothorax should be used not as a preliminary procedure to thoracoplasty but that this latter procedure is to be reserved only for the treatment of such complications as bronchopleural fistula and uncontrolled empyema. Extrapleural pneumothorax should not replace thoracoplasty. Except in a few cases we do not feel that our indications for thoracoplasty has changed but rather that the procedure of extrapleural pneumothorax widens the field of collapse therapy and provides us with an additional surgical procedure to be offered to a group of patients in whom formerly conservative treatment alone could be used.

We would like to group under the indications for extrapleural pneumothorax the following four groups:

1. Bilateral disease where preservation of the functioning lung is paramount. Where intrapleural pneumothorax has failed and the lesion to be collapsed is too extensive to use paraffin pack, extrapleural pneumothorax is the only procedure that can be safely offered to the patient.

2. Progressive lesions failing to stabilize sufficiently for thoracoplasty.

3. The "indolent" tuberculous lesion. Under this group, we mean to include those in which the extent has never become great, where cavity may or may not be present, but in which arrest of the lesion is not secured by bed rest with or without phreniclasis, and in whom intrapleural pneumothorax has been unsuccessful. These cases usually are young adults who have spent years in and out of the sanatorium. The lesions have never progressed to the stage where the patient or the doctor is willing to accept thoracoplasty as inevitable. In this group the reaction to surgery is minimal; the resulting extrapleural pneumothorax is very seldom accompanied by complications; and there is often a definite tendency of the collapsed lung to re-expand. We have noted this in a few of our cases over our short period of observation, and it has also been reported by Proctor, whose experience dates back to 1935. We feel that this group should be given the benefit of the possibility that their lung might re-expand after having been collapsed long enough to control the disease.

4. The progressive lesions of children. Included in this group are the lesions which begin as minimal and gradually spread, without cavitation or symptoms, in spite of the long trial of best rest. For several years we have felt that whenever possible this group should be treated by pneumothorax, as their eventual prognosis is not good. On the other hand, we have hesitated to consider thoracoplasty, particularly when cavitation and positive sputum are not present. As a result many of these patients have been kept on bed rest for long periods of time and have been eventually discharged only to be readmitted with further involvement of their lungs. We feel, for the same reason as given under the third group, that extrapleural pneumothorax is the procedure of choice. In addition to these reasons, the deformities such as scoliosis, so often seen when thoracoplasty is performed on the immature, are avoided.

Summary

A description of the procedure of extrapleural pneumonolysis for the production of extrapleural pneumothorax has been given together with an outline of proper aftercare. A presentation of our series of cases with a description of the complications encountered and the treatment of these has been given. A discussion of our impressions resulting from observation of this series particu-

larly stresses the efficiency of sputum conversion, the minimum of good lung sacrificed, and the importance of proper postoperative care. The use of oleothorax in maintaining permanent collapse rather than subsequent thoracoplasty has been advised.

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THE RETINAL MANIFESTATIONS OF SUBACUTE BACTERIAL ENDOCARDITIS*

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RETINAL hemorrhages of different types are commonly noted in subacute bacterial endocarditis. They appear and disappear at various intervals during the illness, often leaving little or no trace of their existence. Moore[6] states that hemorrhages occur at sometime during the course of the disease in almost all instances. Friedenwald and Rones[3] believe that the so-called "septic retinitis" first described by Roth[8] is rather characteristic of subacute bacterial endocarditis. Typically, this variety of retinitis consists of petechial hemorrhages with yellowish or white centers. Even more significance has recently been attached to these or similar lesions by Doherty and Trubek[1] who describe elliptical hemorrhages with white centers and state that they may be of aid in the early diagnosis of endocarditis.

Embolism of vessels of the retina and choroid is known to occur and is productive of various ophthalmoscopic pictures. Middleton and Burke[5] found embolism of the central artery of the retina but once in a series of eighty-eight cases.

Mention of involvement of the disk in subacute bacterial endocarditis has been omitted in the recent literature. Falconer, in 1910,[2] noted the occurrence of optic neuritis, but since his report, allusion to changes in the disk has been found but three times, *i.e.*, in the reports of Yater and Wagener, in 1929,[9] Friedenwald and Rones, in 1930,[3] and Middleton and Burke, in 1939.[5]

My interest in the disk lesions in subacute bacterial endocarditis was aroused by the observation of marked papilledema in a patient having normal spinal fluid pressure recently studied on the Medical service of the University of Minnesota Hospital. The present study was made in order to determine the incidence of disk involvement in subacute bacterial endocarditis and to determine the degree of correlation of these lesions with other manifestations of the disease.

Material

The case records of sixty-seven patients having subacute bacterial endocarditis were examined. All of these had been hospitalized since January, 1929. From this group thirty-seven cases were selected for study. These were chosen on the basis of a positive diagnosis together with a report of examination of the fundi. The diagnosis was confirmed by autopsy in seventeen instances. A record of positive blood culture was noted in all cases except one, but in this the diagnosis was confirmed at necropsy.

Results

The results of the investigation are given in the accompanying tables. Table I includes the results for Groups A and B, the cases with abnormal ophthalmoscopic findings. Group A includes those with disk involvement, Group B those with retinal changes alone. Group C, in TableII,* includes cases in which the fundi were normal.

Comment

The relatively high incidence of lesions involving the optic disk is noteworthy. Thirteen cases or 35 per cent of the series showed disk pathology.

Case number eight of Group A will not be included in the ensuing discussion since, in the

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*See page 242.

TABLE I—GROUP A

Case No.	Approximate Duration	Ophthalmoscopic Findings		Blood Pressure	Temperature	Hgb. %	Leukocytes	Sp. Gr.	
		Disk	Retina						
1	12 mo.	Bilateral papilledema, 3 diopters.	Peripapillary edema "boat" shaped hemorrhages with white centers. Pre-retinal hemorrhage in right eye. Several small choroid hemorrhages around indistinct nerve margins.	96/70	Spiking 102.8°	70	16,000	1.011	
2	1½ mo.	Some blurring of right.	One large petechial hemorrhage in left eye.	100/60	Spiking 102.6°	65	12,000	1.018	
3	1 mo.	Suggestion of early optic neuritis of left eye.		124/72	Spiking 103.8°	73	16,550	1.015	t
4	5 mo.	Right: Edematous, margins indistinct. Left: Definite edema. Venous pulsation.	Right: Details hazy as if hidden by a diffuse edema. Just below macula a patch of grayish-white exudate with a hyperemic border. Left: Two large patches of exudate along vessels.	128/70	96° to 100.4°	55	10,000	1.015	0
5	8 mo. (?) or 1 wk.	Right: Elevated 2 diopters. Left: Elevated 2 to 3 diopters.	Left: Some flame-shaped hemorrhages scattered over fundus, especially near the disk.	104/70	Spiking 103°	47	11,000		t
6	3 mo.	Bilateral optic neuritis.	Slight diffuse retinal edema. Many flame-shaped hemorrhages in both retinæ. Large petechial hemorrhage in macular area on right. Area of exudate (or retinal degeneration) in superior temporal quadrant on right.	110/70	Spiking 103.4°	45	28,300	1.015	1+
7	4 mo.	Bilateral choked disks, 1 - 2 diopters.	Circumpapillary edema extending out to adjacent retina. Old flame hemorrhages.	110/70	Spiking 102°	70	14,000	1.022	1+
8		Blurred margins.	Petechiæ on subsequent examinations.	134/84	Spiking 104°	42	14,300	1.016	3+
9	4 mo.	Blurred disks.	Hemorrhage in left.	115/72	Spiking 102°	60	9,000		tr.
10	6 mo.	Suggestive hemorrhage of right.	Pale fundi.	125/48	Spiking 102°	38	4,600		3+
11	5 mo.	Old and fresh hemorrhages of right.		80/62	Spiking 103.4°	62	6,250	1.022	1+
12	7 mo.	Hemorrhages about the nerve heads.		118/80	Low 98°	45	11,000	1.010	2+
13	13 mo.	Slight bilateral optic atrophy.		98/64	Spiking 103.8°	58	12,000	1.015	tr.

TABLE I—GROUP A

Urine					External Petechiæ	Cerebral Manifestations	Visual Disturbances	Spinal Pressure	Blood Culture	Remarks
Sp. Gr.	Alb.	Casts	R.B.C.	W.B.C.						
1.011	1+	hyaline granular,& leukocytic	num.	num.	+ Showers	Cerebral accident one month before admission. Rt. hemiplegia.			non-hemolytic Strep.	
1.018	tr.	0	0	0	+	Four months later had cerebral embolus with resultant left hemiplegia, aphasia and + right Babinski.			Strep. Vir.	
1.015	tr.	occ. gran.	0	occ.	+	Right hemiplegia, aphasia.			Strep. Vir.	
1.015	0	0	few	few					Strep. Vir.	
	tr.	0	occ.	many	+		Patient noted failure of vision 5 days after exam.		Strep. Vir.	
1.015	1+	0	0	occ.	+		Periods of transient blindness left eye 3 mo. prior to admission		Strep. Vir.	
1.022	1+	gran.	20 to 30 per h.p.f.	10 to 15 per h.p.f.	+			Normal 14 to 22 to 14 mm. Hg.	Strep. Vir.	
1.016	3+	occ. gran.	occ.	many	+			18 to 30 to 18	Staph. Diphth.	4+ Wass.
	tr.	0	0	few	+ later				Strep. Vir. & Staph.	
	3+	0	100 per h.p.f.	18 per h.p.f.	+				Microæro Strep.	
1.022	1+	0	few	num.	+	Right hemiplegia(?) Disoriented. Neck rigidity. +Kernig(?)				
1.010	2+	0	num.	v. occ.	+	Hemiplegia.			Previously positive	
1.015	tr.	0	0	0	+	Right hemiplegia.	Photophobia 6 weeks		Strep. Vir.	

TABLE I—GROUP B

Case No.	Ophthalmoscopic Findings		Blood Pressure	Temperature	Hgb. %	Leukocytes
	Disk	Retina				
1		Small patch of brownish-black pigment in right eye.	112/60	Low 98°	70	14,350
2		Oval hemorrhagic-like area in lateral left fundus.	130/64	Spiking	65	12,700
3		One petechia in left retina.	130/50	Spiking 104°	58	9,900
4		Flame hemorrhage in left. Subretinal hemorrhage in right.	122/67	Spiking 102.6°	41	8,800

presence of a four plus Wassermann reaction, lues could not be excluded as the cause of the blurred disk margins.

Exact classification of the disk lesions is extremely difficult. Several possibilities present themselves: optic neuritis, papilledema, embolic neuroretinitis, or combinations of these. Troncoso[7] mentions intermediate forms between optic neuritis and papilledema that can be differentiated clinically only on the basis of the type of visual disturbance present.

There are several possible factors in the pathogenesis of these lesions. Toxemia, a mechanism which Falconer[2] favored, probably is of importance. Embolic processes in the retinal vessels should receive serious consideration. Nearly one-half of those cases with disk lesions showed evidence of emboli in the cerebral circulation either shortly before or after the report of the funduscopic examination. Since the retinal and cerebral circulations are so intimately related, it is easy to suppose that emboli would also lodge in the retinal vessels. This was found to be the essential pathology in Friedenwald's first case.[3]

Increased intracranial pressure as a cause of the edema of the nerve heads must be considered. In the present group the one reliable spinal fluid pressure reading was within normal limits, so the edema in at least one instance was not due to increased pressure.

Middleton and Burke's case number four developed cerebral hemorrhage from a mycotic aneurysm. The eye findings of an optic neuritis were present before symptoms of the hemorrhage occurred, but could have been the result of some leakage over a period of days.

Another factor known to cause abnormal funduscopic pictures is severe anemia.[1,4,7,9] Low hemoglobin values are noted in Groups A and B (with retinal pathology), but comparable reduction is also observed in Group C (without changes in the eyegrounds).

Reference to the tables will reveal that petechiæ are not always present in the cases showing disk lesions. No petechiæ could be found in case number four of Group A, although thorough searches evidently were made. However, it is of interest to note that in Group A, 91.6 per cent (eleven cases) exhibited external petechiæ, although they were recorded in but 55 per cent (eleven cases) of Group C.

Cerebral embolic phenomena occurred seven times in the entire series of thirty-seven cases. Six of these were among the group with nerve head pathology. Thus it is clear that disk pathology can be expected with considerable regularity in those cases of vegetative endocarditis showing evidence of cerebral emboli.

Variations in blood pressure, temperature, and leukocyte count failed to reveal significant correlation with the occurrence of nerve head lesions. Abnormally high blood pressures were not observed. The temperature elevation and leukocyte counts varied in approximately the same manner throughout the entire series. Most of the cases of Group A exhibited high leukocyte counts, but there are numerous counts just

TABLE I—GROUP B

Urine					External Petechiæ	Cerebral Manifestations	Visual Disturbances	Spinal Pressure	Blood Culture
Sp. Gr.	Alb.	Casts	R.B.C.	W.B.B.					
1.020	0	0	0	occ.					Strep. Vir.
1.017	tr.	num.	5 to 10 per h.p.f.	2 to 4 per h.p.f.					Strep. Vir.
1.008	tr.	num. hyaline	num.	few	+				Staph. later Strep.
1.008	1+	0	occ.	num.	+	Cerebral embolic phenomena	Impaired before adm.		Previously positive

as high among those of Group C. Urinalysis also demonstrated no outstanding abnormality characteristic of one group more than another.

Visual disturbance is, as one would expect, the one finding that seems definitely confined to the group with nerve head changes (Group A). The surprising fact is the relatively infrequent occurrence of visual disturbance in this group, although it is possible that there were some instances that were not recorded.

Falconer[2] believed that the finding of optic neuritis aids in making an early diagnosis of vegetative endocarditis. Therefore, it would be interesting to determine the amount of time which elapsed between the onset of symptoms of the disease and the appearance of the disk lesions. No conclusions bearing on this point can be drawn from the present study because the onset of the papilledema was exactly dated in but one case (number seven in Group A).

Summary and Conclusions

1. The subject of retinal findings in subacute bacterial endocarditis has been discussed and the literature has been reviewed briefly.

2. Thirty-seven cases of subacute bacterial endocarditis were selected for study on the basis of a positive diagnosis and a record of ophthalmoscopic examination.

3. Study of this series reveals that:
   a. Nerve head lesions are not infrequent, being present in 35 per cent of the cases.
   b. The nerve head lesions are correlated to some extent with visual disturbances and cerebral accidents. Blood pressure, temperature, hemoglobin, leukocyte count, and urinary study showed no correlation. Petechiæ are more consistently found in the cases with disk pathology.
   c. Marked bilateral papilledema may be present in vegetative endocarditis without elevation of the spinal fluid pressure.

4. More emphasis should be placed on ophthalmoscopic examination in subacute bacterial endocarditis, with particular attention paid on the condition of the nerve head. Eyeground abnormalities may prove of aid in diagnosis.

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TABLE II

GROUP C (Negative Ophthalmoscopic)

Case	Blood Pressure	Temperature	Hgb.	Leukocytes	Urine					External Petechiae	Cerebral Manifestations	Blood Culture
					Sp.Gr.	Alb.	Casts	R.B.C.	W.B.C.			
1	120/78	Spiking 102°	45	15,900	1.014	2+	gran.	3 – 4	100 per h.p.f.			Strep. Vir.
2	94/72	100.2° to 101° (R)	68	31,700	1.025	tr.	hyaline	few	few	+		Strep. Vir.
3	112/62	Spiking 102°	54	6,900		1+	0	occ.	occ.			Strep. Vir.
4	120/74	Low 98.2°	40	12,300	1.012	1+	0	many	few	+		Strep. Vir.
5	128/70	Spiking 103°	70	16,500	1.012	0	0	occ.	0	+		Strep. Vir.
6	85/56	Spiking 101°	70	8,700	1.027	ft. tr.	0	occ.	occ.			Staph. Alb.
7	96/70	Spiking 102°	57	9,800	1.014	0	0	0	0	+		Strep. Vir.
8	82/36	Spiking 103	40	11,500	1.010	2+	0	0	few	+	Mult. cereb. acc.	Strep. Vir.
9	96/60	Spiking 103	56	6,000	1.022	0	0	0	few			Strep. Vir.
10	94/58	Spiking 102°	69	13,950	1.030	0	0	0	0			Strep. Vir.
11	110/70	Spiking 103°	67	19,400	1.027	tr.	0	occ.	occ.	+		Strep. Vir.
12	97/67	100°	140	10,700	1.020	Cl.	hyaline gran.	many	few			0
13	130/66	Spiking 101+°	103	7,100	1.020	0	0	0	0	+		Strep. Hem.
14	134/78	Spiking 102°	56	6,300	1.014	tr.	0	0	few	+		Strep. Vir.
15	75/50	Spiking 102°	41	20,100	1.013	1+	num. gran.	few	num.	+		Strep.
16	122/70	Spiking 102°	66	4,600	1.021	1+	num. gran.	very occ.	occ.			Strep. Vir.
17	148/50	Spiking 103.4°	54	5,500	1.018	1+	occ. gran.	0	very occ.	+		Strep. Vir.
18	108/80	Spiking	57	7,400	1.016	2+	0	0	many			Strep. Vir.
19	126/54	Spiking 102°	78	8,900	1.020	0	0	loaded				Strep. Vir.
20	120/70	Spiking	64-54							+		Strep. Vir.

There were no visual disturbances nor spinal pressure recorded in any of the cases here listed.

TREATMENT AND END RESULTS IN APPENDICITIS*

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FOR several years there has been an intensive campaign intended to educate the public on the subject of appendicitis. This education encompasses two chief objectives: (1) admonition against the use of cathartics in the presence of abdominal pain and (2) advice to seek medical counsel early when abdominal pain is present.

The motive is to prevent complications of acute appendicitis from developing since it is conceded that the chief mortality is in the complicated cases. However, there is another phase to the reduction of appendicitis mortality and that rests squarely on our shoulders as physicians. This is to reduce the mortality of complicated appendicitis by improved treatment. This will create an immediate marked decrease in appendicitis deaths. Bowers,[2,3,4] in Philadelphia, is doing remarkable work in reducing appendicitis deaths in that city and the same measures can be undertaken everywhere by organized groups such as state or county medical societies.

Teachings of Wilkie and the recent work of Wangensteen[16,17] regarding the etiology of appendicitis leaves little doubt as to the cause being obstructive in the majority of cases. This obstruction may be caused by various factors: kinks, bands, retrocecal fixation, strictures or lymphoid tissue swelling; and with a normal luminal resistance to outflow, appendicitis may ultimately be produced.

Classification

A classification is used that is based on the gross pathology seen at the time of operation. This is most useful in interpreting end results from various methods of surgical treatment (Table I).

In the first group are included interval appendicitis, mildly acute, subsiding and chronic appendicitis. Obviously, each differs in the clinical picture but they are similar in methods of treatment and mortality.

The second group is that of acute appendicitis and consists of all cases in which the appendix is acutely inflamed or obstructed, in which perforation has not occurred and the peritoneum is not seriously involved.

TABLE I. CLASSIFICATION OF CASES
(At Operation)

	Average of Collected Cases from Literature (Percentage)	Author's Series (Percentage)
Interval, Chronic, Subsiding and Subacute Appendicitis	20 to 25	16.6
Acute Appendicitis	50 to 60	65
Acute Appendicitis: Ruptured with Early Peritonitis, Localized Peritonitis or Appendiceal Abscess	15	13
Acute Appendicitis: Ruptured, with Diffuse or Generalized Peritonitis	5 to 8	5.4

In a third group are placed cases of acute appendicitis, usually ruptured, with localized peritonitis or appendiceal abscess. The factor of time is not considered as of value in classification but rather the extent of the lesion.

In the fourth group are placed the peritonitis cases of unlocalized extent. The term diffuse peritonitis is preferred to all other terms as being the truest one to represent this condition rather than spreading or generalized peritonitis. It has been demonstrated that true generalized peritonitis occurs rarely.

Mild and Chronic Appendicitis

In the indications for operation, it is believed that appendectomy is justified in the interval following an acute attack. Conservatism is desirable in performing interval operations when the patient has not been personally seen in an acute attack.

Some believe that a diagnosis of chronic appendicitis is not warranted; others believe it

*From the Two Harbors Hospital. Read before the annual meeting of the Northern Minnesota Medical Association, Duluth, Minnesota, July 19, 1940.

quite common and operate accordingly. The majority believe that it does occur, that it is not common and that a most careful exclusion diagnosis is necessary before operation is justified.

Shelley[15] reports the follow-up of 704 patients operated on for chronic appendicitis. The highest percentage of cure in this group was obtained in patients with evidence of inflammatory change or obstruction found at operation. Patients with findings of tenderness in the right lower quadrant and muscle spasm and not showing evidence of acute inflammation pathologically obtained as much relief from operation as those showing acute inflammation. Many of those were doubtless cases of appendical colic so recently elaborated by Cherney.[5]

Rea and Kleinsasser[14] in a follow-up study of 143 cases operated with a diagnosis of "inactive appendix" point out the interesting fact that many patients recover from appendical colic who show no pathologic changes in the appendix.

Acute Appendicitis

There may be considerable difference of opinion regarding the frequency or indications for chronic or interval appendectomies, but there is practically universal agreement that in uncomplicated acute appendicitis, immediate operation is indicated. The manner of removal is not nearly so important as the necessity for removal. There is wide variation in the severity of the pathologic picture in this group from the mild to the gangrenous.

The surgical approach in appendectomy has many variations and all methods have their exponents. McBurney's incision or some modification is the most commonly used incision and many surgeons use it routinely. The appendix occasionally is found in an unexpected situation in which the McBurney incision increases the technical difficulties. In the majority of cases, the clinical examination will determine approximately the best method of approach to the appendix and will also give a clue as to the possibility of an abnormally situated organ. Consequently, a routine incision is not always desirable but it must be tailored to the case.

The paramedian incision over the right rectus muscle retracting the muscle laterally in its sheath fulfills every requirement for a satisfactory appendectomy. Extension of the incision is easily accomplished and other organs examined or treated surgically as necessary. The Battle incision or some modification is used by many surgeons.

The surgical technic will not be discussed except to emphasize adequate and complete hemostasis, use of fine catgut, use of suction rather than gauze to remove exudate or blood, protection of the abdominal wound from infected peritoneal contents and avoidance of gauze intraperitoneally. The stump is treated with phenol and alcohol though no harm has been observed by omitting this step. The stump of the appendix is inverted. The practice of inverting the stump is one that has been used by a number of surgeons for many years. It appears to be a more surgically clean method than leaving the ligated stump free or buried in the meso-appendix or omentum. Certain requisites are necessary for inversion: control of all bleeding, avoiding the puncture of vessels in placing the purse string suture and a cecal wall not seriously involved in the inflammatory process.

On the basis of experimental studies, Donaldson[6] concluded that inverting the stump was preferable and Kross[11] concluded that inversion resulted in complications, so experimental evidence does not seem to be uniform.

If drainage is indicated, and it rarely is, a Penrose drain is used. The wound is closed with fine chromic catgut interrupted sutures. Tension sutures are not used inasmuch as they never assume tension but merely approximate the subcutaneous tissues and these can be approximated more efficiently by direct suture with fine interrupted plain catgut sutures. The dressing is seldom changed until time for the removal of the skin sutures or clips unless wound inspection is desired or drainage has been used.

Treatment of Localized Peritonitis

The treatment of complicated acute appendicitis with peritonitis requires for success the full measure of knowledge, skill and judgment of the surgeon.

While immediate operation is indicated in uncomplicated acute appendicitis, it is not always so highly recommended when perforation or signs of peritonitis are present. Usually these patients have been sick a longer period of time or at least the lesion is more extensive. Their condition is not always ideal for immediate operation and corrective measures can be instituted

before operation that will in a short period of time better enable them to withstand surgical intervention and the immediate postoperative stage. The toxicity can be corrected by fluids, intravenously or subcutaneously, transfusion, if necessary, rest and relief of pain. Also, the diagnosis is not always entirely obvious at the time of admission and observation is advisable to obtain more information before making a decision, during which time these measures can be carried out. Operation is preferred in all cases of this class or thought to be in this class after the dehydration has been corrected and any other toxic symptoms relieved. This practice of operation after correcting toxicity is early operation as contrasted with immediate operation.

Appendical abscess is treated in the same manner. An abscess is merely a stage of localized peritonitis and, consequently, deserves treatment on the basis of pathology rather than size or duration of the lesion. When the abscess surrounds the appendix and is small and mobile, it may be removed in its entirety; otherwise, the effort is made to open into the abscess and protect the uninvolved peritoneum. The appendix is removed in all cases of perforation and of localized peritonitis, if possible. In the occasional case, removing the appendix may entail the separation of barriers best judged to be left undisturbed. The appendix was removed in all cases reported in this series.

Drainage is usually but not always practiced with localized peritonitis. Well walled-off perforations with a small amount or possibly no pus present do not always require drainage even with some inflammatory reaction in the surrounding tissues. In the presence of frank pus, localized or unlocalized, drainage is usually indicated. When draining, a Penrose drain gives satisfactory results, one usually being sufficient to insure a sinus formation.

In the postoperative management, these cases are treated similarly to those of diffuse peritonitis.

Treatment of Diffuse Peritonitis Complicating Acute Appendicitis

There has been great controversy in the method of treatment of this truly serious surgical disease. The deferred method or Ochsner treatment of appendicitis with peritonitis has many advocates[1,8,12] who cite very good results with this method. Equally good results are reported by other surgeons[9,10,13] using early operation as the method of choice. The chief principle in the deferred method is absolute rest of the gastrointestinal tract. This consists in the use of continuous gastroduodenal suction, relief from pain, a balanced intake of water, minerals, intravenous dextrose and blood, and bed rest. Abscess formation is treated by surgical drainage if the abscesses do not resolve spontaneously. After the symptoms and signs have subsided and the patient recovers, the appendix is removed by interval appendectomy two to four months later.

The objection to unqualified use of the deferred treatment in peritonitis is that this treatment is best reserved for only a small percentage of cases and it is not always easy to say which cases fall into this group. Each case must be individualized. There is no assurance that a hospital bed, ice bag, morphine and fluids will necessarily result in subsidence of a peritoneal infection. Also, it is difficult to say just when peritonitis is present, and, if present, whether it is spreading or stationary. It is the contention of Ochsner that spreading peritonitis is definitely harmed by operative trauma. Ochsner admits that conservative treatment is very difficult and taxes the surgical judgment to the utmost and also states that the inexperienced surgeon will do better to operate on these patients than to institute conservative or deferred treatment. It may be pointed out, however, that a fundamental principle in the treatment of a diffuse peritonitis may be the removal of the source of infection. In some cases of diffuse peritonitis there is a continuous leakage taking place from the perforated appendix. Furthermore, the occurrence of localization in any one case is not certain. Even if localization occurs, it may break down into a diffuse peritonitis.

Immediate operation is to be condemned because it carries a high mortality. These patients are in poor general condition because the lesion is extensive, they are dehydrated by vomiting, and they are weak because of lack of rest caused by the pain. With operation superimposed upon this poor general condition, a high mortality results. As opposed to deferred treatment or immediate operation is treatment by early operation. Again the definition of early operation is operation after the general condition of the patient has been improved to the maximum by cor-

rection of toxicity, dehydration and exhaustion. Obviously, no definite rules can be laid down as to when the patient is in the best condition. The judgment of the surgeon must be the final deciding factor rather than any one laboratory procedure or any sequence of symptoms. "The extent the lesion has affected the individual is more important than the extent of the lesion." (Elman[7])

In the usual patient admitted with diffuse peritonitis, absolute rest is insisted upon in so far as compatible with treatment. Intravenous saline and dextrose solutions are given and blood if indicated. Gastroduodenal suction is started and morphine is given for the relief of pain if the diagnosis is unquestioned. Within a few hours, improvement is usually noted, and the patient is then operated upon with a better chance of recovery. The surgical approach is carefully determined on the basis of examination and the probable location of the appendix. Operation itself is carried out rapidly but not at the expense of gentleness or omission of necessary steps. Suction is used to remove all peritoneal exudate or pus. The wound must be protected against contamination from the infected peritoneal contents. The appendix should be removed and unless perforation is recent, drainage is instituted with one or more Penrose drains along the lumbar gutter and in the pelvis. The wound is either closed about the drain or up to and including the fascia of the external oblique muscle or the anterior rectus fascia and the subcutaneous tissues and skin are left open and secondary closure carried out later.

Good and adequate postoperative treatment is needed by these acutely ill patients. Gastroduodenal decompression is routinely practiced until audible peristalsis is heard. Five per cent dextrose with saline and alternately without saline is given slowly in adequate daily amounts as judged necessary by the urinary output. The relief of pain, of course, is continued with morphine in necessary dosage and frequency. Chemotherapy is used in most cases, depending upon the severity of the infection. Bacteriological findings of the material obtained at operation is seldom useful as a guide in the treatment.

Sulfanilamide has been used with increasing frequency in these cases, being administered intravenously immediately before or after operation and intramuscularly or subcutaneously with saline or other infusions thereafter. Ravdin[13] reports the use of sulfanilamide in 257 cases of acute appendicitis complicated by peritonitis with only one death. This is the lowest mortality appearing in the literature for a series of cases of this length and severity. He used an average of 8 Gm. the first day and reduced the dose each day thereafter depending upon observation. Transfusions were used somewhat oftener in his series of sulfanilamide treated cases. In the postoperative management, transfusions are frequently desirable even though indications are not imperative. While routine use of transfusion is not recommended, most of these patients will require one or more to supply protein if for no other reason. Children particularly seem to derive much benefit from transfusions, possibly because they require a proportionately greater amount of protein than adults. Gatch[9] has particularly emphasized the use of transfusions in these serious complicated cases in children and attributes his low mortality of .6 per cent to the more frequent use of transfusions.

It is believed from results obtained in the series of cases reported that early operation is a method of choice except in the rare case where an overwhelming infection is obviously present. However, the virulence of the infecting organism or organisms is a factor influencing the course of events.

There is one type of case that demands particular consideration. Patients who on admission present a high temperature of 104 to 106, a rapid pulse and signs of advanced systemic infection represent a virulent invading type of infection. A history of chills at the onset of the illness may be given but this does not necessarily indicate a virulent infection. These patients are restless and may be mildly irrational at times. The symptoms and signs of systemic infection dominate the picture. The abdominal symptoms may not be outstanding but signs of peritonitis are present. The infection will not be helped by immediate operation. Moreover, the patient will be less able to combat the infection in the lymphatics and blood stream after such an operation.

A routine peritonitis régime of treatment is instituted consisting of gastroduodenal decompression, fluids parenterally, relief of pain, and, in addition, measures to combat the infection must be instituted with emphasis on absolute rest, adequate chemotherapy and transfusions.

After recovery, appendectomy is done any time after three weeks. There may be recurrence. Consequently, too long a waiting period is not advisable. Roughly, one per cent of all appendicitis cases fall into this group which present, on admission, peritonitis with serious systemic invasion. These patients are always treated conservatively. If there is some doubt as to the patient being in this class, operation is carried out in preference to deferred treatment.

In the postoperative treatment of diffuse peritonitis, the watch for complications must be vigilant, and, when present, they should be recognized early and dealt with wisely. Administration of oxygen by nasal catheter or oxygen tent reduces the respiratory effort when abdominal distention is great and benefits the patient to a great extent. It is frequently desirable to administer vitamins, particularly when nourishment is not taken for a period of several days since the supply in the body tissues becomes rapidly depleted under such circumstances.

The most common complications are wound infection, and, second, abscess formation. Treatment of wound infection scarcely needs amplification. Adequate drainage is indicated, but this does not mean laying the entire wound open. Drainage and counter-drainage will suffice and the time of complete healing will thereby be shortened. Wound infection involving all layers will often result in postoperative hernia unless the patient is confined in bed for longer than the usual period (Table II).

Peritoneal abscess formation is usually indicated by persistence or secondary rise in the temperature curve but usually has been recognized previously or suspected when daily examination is made. An abscess near or about the appendix will often drain into the sinus provided by the drain. Subphrenic abscess, fortunately, is not a common complication, but must be considered when the presence of a hidden suppuration is suspected. Early drainage is necessary, depending upon the space involved.

TABLE II. COMPLICATIONS OF APPENDECTOMY

TYPE	Averages from Literature (Percentage)	Author's Series (Percentage)
Pneumonia	6	3
Wound Infection	5	6
Pulmonary Atelectasis	4	5
Intraperitoneal Abscesses	3.5	1
Fecal Fistula	1	1
Thrombophlebitis	1	0
Peritonitis	1	0
Subphrenic Abscess	.5	0
Pleurisy	.5	1
Liver Infection	.5	0
Embolism	.2	0

Appendicitis in Children

Acute appendicitis in children is the same disease and should be similarly treated. Generally it is stated that perforation occurs early in children. This may partly be due to the fact that the onset of the disease is recognized later in children. The loss of protein in the peritoneal exudate often results in protein deficiency in children. Consequently, they need transfusions oftener than adults.

Serum Therapy

From the European continent have come sporadic reports relative to the use of serum in connection with surgical treatment of appendicitis. This is in the nature of an antitoxin and is administered intraperitoneally as well as intravenously and intramuscularly. The reports to date have not been sufficiently comprehensive to establish this method as valuable in the treatment.

Mortality in Appendicitis

A survey of mortality in appendicitis published in the past two years gives us an average mortality rate of all types of cases of about 2.6 per cent. In collected series, the average mortality ranges from 0.4 to 5 per cent.

For different types of appendicitis, the rates vary. In chronic or interval appendicitis, there is practically no mortality. In acute uncomplicated appendicitis, the average mortality is 0.5 to 0.8 per cent. For acute appendicitis with localized peritonitis, mortality varied in different reports from 0.4 to 8 per cent. For diffuse peritonitis, the mortality in this series varied from 0.4 to 37 per cent.

The author reviewed a series of 114 consecutive cases of appendicitis treated at the Two Har-

bors Hospital within the past two years, 107 of which were personal cases. Among these, eighteen were for interval, chronic, subsiding or subacute appendicitis, seventy for acute uncomplicated appendicitis, fourteen for acute perforated appendicitis with localized peritonitis, and six complicated by diffuse peritonitis. In six instances appendicitis was diagnosed but no operation was performed because of the mildness of the attack or the patient's wish to defer operation. There were no deaths (Table III).

TABLE III

	Number of Cases	Average Age	Average Number of Previous Attacks	Complications Percentage	Mortality
Interval or Chronic Appendicitis	18	24	1.8	5.5	0
Acute Appendicitis	70	26	1	13	0
Perforated Appendicitis (Localized)	14	24	.6	36	0
Perforated Appendicitis with Diffuse Peritonitis	6	24	2	50	0
Appendicitis No Operation	6	36	.15		0

Conclusions

Indications for appendectomy in nonacute cases are broadened to include mild acute or so-called subacute appendicitis, appendical colic or appendiclausis, and cases seen in acute attack but not operated during the acute phase. Interval appendectomy is suggested as one means to decrease appendicitis mortality since cases of severe appendicitis with peritonitis usually give a history of definite previous attacks.

It is necessary to correct toxicity in most cases to obtain the lowest mortality in appendicitis complicated by localized or diffuse peritonitis.

In the treatment of these severe cases of appendicitis, the pre-operative treatment, the time of operation and the postoperative management are paramount to technic or type of operative procedure.

Early operation after adequate pre-operative treatment is recommended for all types of complicated appendicitis in preference to deferred operation except for the occasional case which presents the picture of a virulent invading systemic infection. Deferred treatment followed by appendectomy is recommended for the 1 to 2 per cent of cases comprising this group.

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APPENDECTOMIES*

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FOR the past few years I have been watching with interest some of the statistics on appendicitis. I have been surprised at the high death rates and I have noted that surgeons reporting from their own private practices have, on the whole, had lower mortality rates. That is, of course, entirely logical. At the same time, I have developed a few ideas, in no way new or original, the routine adoption of which have given us such good results that I feel it may be of interest to discuss them here and pass them on into literature to help swell the already overflowing volumes on this subject.

In the past fifteen years little or nothing has been added to help the physician solve the problem of diagnosis on appendicitis. During this period we have, however, obtained tremendous help in its treatment. We have learned to standardize treatment technic and in a small way this has helped to reduce our deaths. There is another factor to which we should give much credit and that is the improvement in the material we work with, such as our anesthesia, antiseptics, autoclaves, instruments, suture material, and especially the advancement and standardization of hospital sterilization technic.

It is not my object to attempt to emphasize or add anything to the diagnostic problem in appendicitis. There is one observation that I should like to record. It is my firm belief that the first man to examine a case of acute appendicitis is the man in the best position to make the diagnosis. The first, light, careful examination of the abdomen reveals the most information. I have always felt that a gas-filled, palpable cecum is one of the very important findings and as soon as one begins deep palpating over the cecal area this gas will pass off and many times, especially in retro-cecal appendices, the patient will immediately complain of less tenderness. I believe this finding, especially in the absence of an otherwise inconclusive picture, is a great help in arriving at an early diagnosis.

We wish to report today on a series of 219 consecutive appendectomies performed at St. Elizabeth's Hospital. Of these, 198 were done for acute or sub-acute appendicitis and were accompanied by no mortality. In twenty-one cases the appendix had grossly ruptured and peritonitis was established to either a very limited or an extremely generalized degree. There was one death or a 4.7 per cent mortality. This death was that of a fifteen-month-old infant who was moribund upon admission and an exploratory operation was advised since the history given by a very ignorant mother suggested an intra-abdominal accident and a peritoneal irritation other than appendiceal in origin.

It is true that this series of cases is small and a little hard luck can make the difference between a low or a high mortality rate. However, I feel it is large enough to permit some inferences.

The economic level of patients and the intelligence and general state of education of a community are important factors. I believe that here in Wabasha County the average patient is well informed, more so than in the average community or certain sections of the larger cities. There are relatively few who do not appreciate the seriousness of a persistant stomach ache and only the very ignorant will resort to laxatives. All these facts are important since it means that we see our appendicitis patients early. The public is more and more beginning to realize that an appendectomy done early in the course of disease is a simple thing with practically no risk. With modern sedatives and anesthesia it is a nice vacation and not a period of suffering.

As to the treatment, there is nearly as great a variety of opinions as there are surgeons operating, and mortality rates vary tremendously. For one thing, I feel that spinal anesthesia on those cases where it can be employed (and in appendicitis it can almost always be used) is by far the finest anesthesia for abdominal surgery. Our patients usually receive 2 capsules of seconal or nembutal one-half to three-fourths of an hour before operation and by perfecting the technic of spinal puncture we have been able to instill

*Read before the Wabasha County Medical Society, Plainview, Minnesota, October 10, 1940.

our anesthesia without the patient, generally in deep sedation, being fully aware of what is going on. With the coöperation of the anesthetist by engaging the patient in an interesting conversation much can be done to relieve the patient's apprehension. The result is that most patients will later confess that during the operation itself they actually had a good time. Post-operatively, in our experience, the spinal patients are much more comfortable and complications are less.

As to the technic of the operation itself, I firmly believe the McBurney incision should be universally adopted. The only exception would be the interval appendix with pelvic or gall-bladder and stomach pathology. Occasionally, one sees a very definitely localized appendicitis outside the right lower quadrant. These cases are probably best approached with a short incision directly down over the maximum point of tenderness. In the case of the very acute or perforated appendix, I believe one should always approach these through a short McBurney's incision.

One commonly hears that through a McBurney's incision it is more difficult to handle bound down, retrocecal appendices. To my way of thinking, that is exactly where McBurney's incision serves its greatest purpose, because in dealing with any retrocecal appendix the simplest procedure is to roll the cecum medially and use an entirely lateral type of approach. On these cases, therefore, the more lateral the incision is the easier is the operation and I have repeatedly found this to be true in all forms of retrocecal appendices and even in retroperitoneal types. In removing the appendix I believe the simpler a technique one employs the better. We are now simply, with one full loop, ligating the entire meso-appendix with one tie; then ligating and cauterizing the stump. I have given up the purse string suture entirely and I believe it is only a possible source of trouble.

Moreover, with the relaxation secured from spinal anesthesia, we have always been able to explore the pelvis and with relatively little difficulty operate on the right side of the pelvis. On the whole, however, when handling a very acute appendix the less exploring and the less additional operating, the better.

In the twenty-one cases of ruptured appendicitis in this series we have employed a technic that, although it is not very new, nor is it original with me, I believe is life saving. In all cases where we encounter a perforated appendix and it is possible to remove the appendix we insert a large catheter into the old appendix stump directly into the cecum and with silk ligate the stump about the catheter. The catheter is then brought out through a stab wound laterally and below the incision. The wound is left quite open. Penrose drains are inserted down to the old appendix bed and the wound is loosely packed open with iodoform gauze. Postoperatively, the catheter is allowed to drain into a bottle and a half-ounce of normal saline is injected into the catheter every two hours to keep the tube patent. We have not had to resort to nasal suction in these cases with one exception. This patient developed a postoperative obstruction proximal to the cecostomy and had to be re-operated upon. The postoperative course of these cases is remarkably smooth and has to be observed to be appreciated. The abdomen is always flat, the patient is allowed to drink water soon after the operation, and has no gas pains and no abdominal distention. In twenty-four hours the iodoform gauze is removed and in three days all drains are removed. In seven days the adhesive tape fixing the catheter to the side is removed and the catheter is allowed to loosen on its own accord. Generally by the following day (eighth) it can be removed. I have often been asked about a resultant fecal fistula. The stab wound through which the catheter is brought to the outside is of course just large enough for the purpose and in every case within 24 hours after removal of the catheter this opening is closed and we see no more fecal drainage. Theoretically, one should be able to accomplish the same end result with continuous suction, especially by the use of a Miller Abbott type tube, but the insertion of this catheter is such a simple thing, its action is so positive and the patient is so much more comfortable, that I cannot understand why it is not more universally adopted. The advantages of bowel decompression, particularly in the area of greatest involvment, can easily be understood. A decompression in this area will decompress the entire intestine and that, too, has been clinically proven. Even toxicity is somewhat lessened with facilitation of elimination and decompression.

Because of the advantages of doing an appendecostomy, or a cecostomy, whichever one pre-

fers to call it, I think one should make it a point to remove every appendix in operating on a ruptured appendix. The only exceptions we have allowed ourselves are those cases where, in a well walled-off abscess, the appendix and the meso-appendix form a part of the abscess wall. In those instances the removal of an appendix is bad surgery and defeats every effort of nature. I believe these abscesses should be well drained.

The controversy still exists as to when to operate on a ruptured appendix. Dr. A. J. Ochsner himself soon realized, after he published his paper describing his method of treatment of appendicitis, that there could be no generalities made. It is simply foolish to attempt to "splint the bowels" in a case that has been thoroughly agitated with large doses of laxatives. Also there are the cases one sees where instead of the usual constipation, the patient presents a history of marked diarrhea. I believe the sooner one operates upon these people with removal of the appendix followed by an appendecostomy, the better. On the other hand, there are the patients showing a severe toxic picture, high fever, a definite spreading peritonitis with either the early, board-like or the later, distended abdomen. These patients certainly should be treated conservatively until localization has occurred. It is not always possible to absolutely establish clinically the certainty of perforation. I believe where any doubt exists, operation should be performed regardless of the length of time the attack has existed. Occasionally, after a few hours' rest with morphine and intravenous fluids, an abdomen that at first appeared typically like an early peritonitis will show a localization entirely in the right lower quadrant and operation done immediately will save the patient the risk of a peritonitis.

I have not attempted to elaborate on statistics in this series. It is sufficient to say that in 198 successive appendectomies the appendix was removed because of disease without a fatality. This series excludes those cases in which routine appendectomies were done along with some other operation.

In the twenty-one cases of perforated appendicitis, there were sixteen instances of generalized peritonitis and five in which the peritonitis was localized. In twelve of those cases ether was used and in nine spinal anesthesia. In thirteen cases an appendecostomy was done and in five the abdomen was closed without drainage. In one case the abdomen was drained without an appendecostomy and in two cases the appendix was not removed. One of the two cases happened to be a little girl in very critical condition with a severe pneumonia.

Of the twenty-one patients with perforation there were four who developed complications. One patient, a fifteen-month-old infant, died of toxemia within eight hours after operation, the only death in this entire series. One patient developed a postoperative obstruction and had to be re-opened. We almost lost this patient. Another patient developed a fecal fistula from the drain wound and was in the hospital three and one-half weeks. One patient developed a hemorrhage from a previously diagnosed duodenal ulcer.

Summary

1. One hundred and ninety-eight successive appendectomies for acute and interval appendicitis were performed without any mortality.

2. Twenty-one cases of perforated appendicitis with peritonitis are reported with one death, a 4.7 per cent mortality.

3. The routine use of an appendecostomy or cecostomy is strongly urged in all cases of perforated appendicitis.

"The medical profession now represents the only important group in the United States which, while harassed from within and without, has shown no slightest signs of capitulation or even of retreat.

"On the basis of this fact, it has automatically placed itself in the position of an intellectual leadership of those individuals, groups and institutions which seek to preserve the important elements of individual freedom and initiative and the principle of 'Free Enterprise.'

"If we live up to this opportunity and the serious responsibility it entails, the physicians of this country can—while preserving the independence of American Medicine—most importantly and vitally serve their country during its period of crisis and greatest stress." —Dr. Edward H. Cary, President National Physician's Committee for Extension of Medical Science.

CASE REPORTS

CLINICAL-PATHOLOGICAL CONFERENCE

Presentation of a Case

MINNEAPOLIS GENERAL HOSPITAL

Frank C. Andrus, Pathologist

History.—The case is that of a fourteen-year-old female child who was first seen in August, 1937, because of the development of enuresis. A low fluid intake and the administration of sodium chloride were advised. In June, 1940, laboratory examination revealed her hemoglobin to be 48 per cent with an erythrocyte count of 2,620,000 and a normal leukocyte count. Urinalysis showed a trace of albumin, an occasional red cell, 25 to 30 pus cells per high power field and a specific gravity of 1.011.

She was admitted to the hospital on December 29, 1940. The mother stated that the child had been quite well until approximately one year previously when she started to complain of marked weakness and anorexia. It was also noted that she drank excessive amounts of water and urinated rather frequently. On December 21, she had her first menstrual period and bled excessively. Several days prior to admission she developed marked frequency of urination, voiding every ten to fifteen minutes but passing only small amounts of urine. She complained of severe thirst and difficulty in breathing. On December 28, marked puffiness was apparent about the cheeks and eyelids. Past history was negative save for scarlet fever in 1938 and pneumonia in the winter of 1939. There had been frequent nose bleeds during the fall of 1940.

Physical examination revealed an under-developed and markedly anemic child who appeared to be acutely ill. Her respirations were Kussmaul in type and the child was in a semi-stuporous condition. She was restless and there was a tremor of her lips and hands and an increased muscle tone, bordering on rigidity. The Chvostek and Trousseau signs were negative. Dry blood was noted in the nares. The mucous membranes were very pale and dry. The lungs were negative to physical examination. A short systolic murmur was heard over the precordium. The heart rate was rapid and the blood pressure was 145/90. The liver edge was palpable two finger-breadths below the right costal margin. No other masses were felt. There was puffiness about the face but no edema of the extremities.

The blood urea nitrogen was 166.6 mg. per cent and the creatinine was 3.1 mg. per cent. The carbon dioxide combining power was 7 volumes per cent. The blood phosphorous was 8.2 mg. and the blood calcium was 7.5 mg. per cent. The plasma proteins were normal.

The patient was given 500 c.c. of sodium bicarbonate solution intraveneously and on the following day, the carbon dioxide combining power had risen to 27 volumes per cent. A flat plate of the abdomen was negative. X-rays of the long bones revealed relative decalcification. An electrocardiographic tracing was normal. Urinalysis revealed a trace of albumin, an occasional red blood cell, and a few pus cells. The hemoglobin was 44 per cent, the erythrocyte count 2,590,000, and the leukocyte count 8,300 of which 89 per cent were polymorphonuclears. The reticulocyte count was 4.1 per cent; the bleeding time 7 minutes and 17 seconds and the clotting time 6 minutes and 45 seconds; the platelet count was 210,000. Two blood cultures were negative. The patient was given a blood transfusion but her hemoglobin, instead of rising, remained at about the same level and during the last few weeks of her hospital stay, it gradually dropped so that at the time of death, her hemoglobin was only 30 per cent.

On the day following admission, her temperature rose to 103 degrees and thereafter was septic in type, varying between 96 and 103 degrees. The child's condition at no time permitted pyelographic studies. On January 9, 1941, the patient complained of pain on inspiration. Crepitant râles were heard in the right lower lung field and a pleurisy or an early pneumonia was suspected. The systolic murmur which had previously been heard was louder and somewhat harsher in character. On January 15 urinalysis revealed 60 to 80 pus cells per high power field with 6 to 8 red blood cells and, on January 19, 1941, a non-fluctuant swelling was noted in the region of the left parotid gland. Several days later, swelling appeared over the parotid region on the right side also. Pus exuded from the left external auditory canal. Subsequently, the right ear also drained pus. At no time during her hospital stay did her condition show any noteworthy improvement. She ran steadily downhill and expired on January 31, 1941.

Clinical Diagnoses: (1) Hypoplastic kidneys; (2) uremia; (3) bronchopneumonia.

Autopsy.—The body is that of a rather slightly developed and poorly nourished white girl measuring 138 cm. in length and weighing an estimated 68 pounds. There is bilateral swelling in the region of the parotid glands. A fluctuant abscess is present behind the left ear. Draining sinuses are present in the region of the lateral aspect of the left thigh, over the left hip laterally, and in the right inguinal region. A decubital ulcer is present over the sacrum.

The peritoneal cavity shows no abnormalities. The right pleural cavity contains approximately 1,000 c.c. of turbid fluid. At the base of the right lung, an encapsulated empyema pocket is found containing approximately 50 c.c. of thick, green pus. The left pleural cavity contains 600 c.c. of clear, serous fluid. The pericardial sac is normal.

The heart is normal save for a soft vegetation 8 mm. in diameter on the auricular surface of the mitral valve. Scattered throughout all lobes of the right lung, there are numerous abscesses varying in size from 2 mm. to 1.5 cm. in diameter. Patches of bronchopneumonia are also scattered throughout this lung. The left lung shows bronchopneumonia but no abscesses.

The spleen is negative. The liver appears somewhat fatty. The gastro-intestinal tract is normal throughout.

The right kidney weighs 40 grams and the left 70 grams. The capsules strip with moderate difficulty tearing with them small pieces of renal parenchyma. Both kidneys contain numerous cysts varying in size from several millimeters to three centimeters in diameter. Numerous cysts contain thick, greenish-yellow pus. Very little kidney substance remains. The urinary bladder and genital organs appear normal.

The parathyroid glands appear to be definitely enlarged. The abscess behind the left ear is found to communicate with the mastoid cells on that side and from there with the middle ear. Smears of this pus reveal gram positive cocci in clusters.

Anatomic Diagnoses: (1) Congenital polycystic kidneys; (2) pyelonephritis; (3) pyemia; (4) acute bacterial endocarditis; (5) pulmonary abscesses, right; (6) bilateral confluent bronchopneumonia; (7) Bezold's abscess, left; (8) parotitis, bilateral; (9) empyema, right.

Discussion

Dr. Milton M. Hurwitz: Congenital polycystic kidneys are seen once in every three to five thousand hospital admissions. One-third of individuals with polycystic kidneys are stillborn or die within the first month of life. If they survive this period, death rarely occurs before the age of twenty years. Most go on to death in the fourth or fifth decades. One explanation of the rarity of the symptoms under the age of twenty years is that in the young patient, the remaining islands of renal parenchyma undergo compensatory hypertrophy to carry out the work of that part of the parenchyma which has been destroyed, whereas, in older patients, this property of compensatory hypertrophy is lost. Approximately the same number of males as females are afflicted with the disease.

The clinical course may be gradual or acute, the chronic form being more common. Death may be due to renal insufficiency, this being the most common cause. If renal infection supervenes, the infection may cause death. These patients, because of their anemia and general debilitated condition, seem to be more prone to intercurrent infections. Hypertension is associated with this condition in more than half of the cases.

Pain is an outstanding symptom. It is located usually in the lumbar region or flank. It is usually dull and aching in character and quite constant. It is probably due to the pressure resulting from the enlargement of the cysts. If hemorrhage occurs into a cyst which communicates with the renal pelvis, renal colic may result due to the passage of blood clots down the ureter. General symptoms are due to uremia or infection. Half of the patients have anemia. An enlarged kidney is palpable in over 95 per cent of the cases; in 75 per cent of the cases, enlarged kidneys are felt bilaterally. Gross hematuria is an early symptom in one-third of the cases. This is intermittent in type. Retinal changes may be found in those who develop hypertension. The urine usually contains some albumin, leukocytes and erythrocytes. Erythrocytes are present microscopically in about 45 per cent of the cases.

The kidneys retain their shape regardless of whether they are small or large. In the great majority of cases, the kidneys are definitely enlarged. In one patient seen at the Mayo Clinic, kidneys weighing 17 pounds each were discovered. The contents of these cysts is usually watery in consistency. Occasionally, it is colloidal in character and if infection has supervened, pus is found within the cysts. The color of the fluid is usually light yellow but may be brown, red, or black, depending upon the amount of blood mixed with the contents of the cyst. Some of the cysts are found to communicate with the renal pelvis; others are isolated. Associated anomalies in the form of liver or pancreatic cysts are found fairly frequently. The number of functioning nephrons is markedly reduced, only occasional islands of parenchyma persisting.

The hereditary aspects of polycystic kidneys are well recognized. Cairns reported ten cases in forty-two members of a family over a period of three generations. Fuller found a family of twenty-seven members over a period of four generations that had nine members afflicted with this disease. Sprent found five syblings affected. The tendency appears to be a dominant one.

Medical treatment consists of diet, treatment of uremia, when it occurs, and urinary antiseptics when indicated. Surgical treatment consists of incision of the cysts to relieve pressure or to stop hemorrhage or nephrectomy. The latter is recommended by Walters and Braasch only when there are definite indications for this procedure, such as a massive infection with pyonephrosis, calculus, renal neoplasm, or tuberculosis. Such a procedure should never be done if the function of the remaining kidney is not found to be within normal limits.

Dr. Frank C. Andrus: This is an unusual type of hereditary or familial disease of the kidneys which points out a good deal in renal physiology. As the cysts increase in size, or as infection supervenes, we have the development of renal insufficiency or sepsis; in this instance, both. The effect of the growing cysts is about the same as if you were to remove three-fourths of the patient's kidney tissue. It is the quantitative reduction in the number of functioning nephrons which accounts for the polynuria, inability to concentrate urine, and renal failure.

Dr. George Fahr: This child developed enuresis late in childhood, at eleven years of age. Now, when a child develops enuresis at eleven years, you look for something very simple. You don't just call it enuresis. What the child had was polyuria. Being a child she would sleep through the micturition period. She had just what you find in the stage of chronic renal insufficiency when the patient is approaching uremia. The first thing that you should do is to take a careful check of the specific gravity of the urine. If you see such a patient in the right state, you also practically always find hypertension. In the early stages, the urine may show a little albumin in a catherized specimen. You don't find white blood cells or red blood cells un-

less they have sudden hemorrhages. This is a paroxysmal thing. Later in the disease pyelonephritis may develop and then the urine will contain albumin. This child had little albumin and very few white blood cells at first. Then you notice that something happened; she ran a fever, rising leukocytosis, and now pus cells were seen in the urine. About the same time she got the parotitis and her pleurisy symptoms that later turned out to be empyema. I think that the pyemia originated from infection of these cysts.

ACUTE PORPHYRIA

W. H. FORD, M.D., and H. L. ULRICH, M.D.
Minneapolis, Minnesota

PORPHYRIA is not an extremely rare disease, but the diagnosis may be missed even after careful study and autopsy. Three cases of porphyria have been found in Minneapolis in the last five months. The diagnosis in our case was made only because of the red urine, which showed the typical spectroscopic bands of porphyrin. Spectroscopic examination was made by Dr. C. J. Watson at the University Hospital.*

Family history and past history were irrelevant except for three attacks similar to the illness described below.

The symptoms were abdominal cramps, nausea, vomiting, constipation, oliguria, pain in the back, legs, feet, arms, and hands, weight loss, muscular weakness, dyspnea, and difficulty in swallowing. The illness lasted about two months, and the patient died a respiratory death.

Physical examination showed a well-developed, poorly nourished, lethargic, white female with normal temperature, rapid pulse, and a blood pressure of 135/100. There was some drooping of the right eyelid, and a purulent nasal discharge. The shoulder girdle muscles showed marked atrophy and almost complete paralysis. The heart sounds were normal. There were a few râles in the chest. The abdomen was slightly tender. The patellar reflexes were absent. The abdominal reflexes were present.

Radiographs of the lumbar spine, pelvis, chest, head, and neck were negative.

The urine was red; specific gravity 1.012, acid reaction, very faint trace of albumin, faint trace of sugar, very occasional hyaline cast and granular casts, occasional epithelial cell, and a few red blood cells and white blood cells. Spectroscopic examination of the urine showed porphyrin.

The hemoglobin was 72 per cent; the red blood cell count 3,640,000. The white blood cell count, differential count, Kline test, blood calcium, blood phosphorous, basal metabolic rate, and spinal fluid were normal. The stool specimen showed pus and mucus. The blood urea was 80 mgm. and blood urea nitrogen 37.38 mgm.

The post-mortem study of the body, the brain, sections of the spinal cord, and the peripheral nerves was essentially negative.

Jan Waldenström[1] has reviewed the chemical and clinical studies of one hundred cases of porphyria. The clinical manifestations exhibit themselves in abdominal symptoms, particularly in colic and obstipation, changes in the blood, hypertension, disturbances of liver, kidney and metabolism, also marked nervous symptoms.

He grouped them as follows:

1. Congenital porphria (Günther's disease). These patients have porphyria in the urine as infants and their skin is sensitive to light. In many cases the disease is familial (recessive type).

2. Cutaneous porphyria (tarda). These cases occur later in life. There is porphyria in the urine. They are sensitive to light and there is a tendency to sclerodermatous changes. They have colicky symptoms. Uroporphyrin i'i'i' is found in the urine.

3. Porphyria acuta; with variable symptoms.
   (a) Latent type, with no symptoms. Found in members of families in which acute porphyria occurs.
   (b) Pure abdominal forms.
   (c) Pure nervous forms; very frequently they have abdominal symptoms.
   (d) Classical porphyria; with colic and paraplegias.
   (e) Comatose types; in which the terminal event is a coma. It begins with abdominal symptoms. There are no paraplegias.

4. The toxic paraplegias. These are not easily classified. Since they are not to be differentiated from the idiopathic, this group should be abandoned.

The condition must be differentiated from neuroses, psychoses, encephalitis, multiple neuritis, Landry's paralysis, periarteritis nodosum. The commonest confusion occurs in acute abdominal symptoms, particularly where there is pain, fever, constipation, vomiting and leukocytosis. In all acute abdominal symptoms, and in cases which present puzzling neurological data, think of porphyria. He records twenty-nine patients undergoing abdominal operation, the mistaken diagnosis being appendicitis in sixteen, ileus in seven, pelvic conditions in four, choleocystitis in two. Gastric or duodenal ulcers have also been erroneously diagnosed. He has never been able to find porphyrin in any other disease.

The therapy which is more or less futile consists of diuretics, alkalies, intravenous morphia or papaverine, calcium and heat. Sedatives, particularly bromides, should be avoided.

The prognosis: In full blown cases, 80 per cent are fatel. The recurrent abdominal type is much less dangerous.

Of his one hundred cases, twenty died within one year from the appearance of the symptoms of the disease. Only two lived eight years. Of twelve known living cases, one has gone on for twenty-seven years.

*The detailed description of the porphyrins encountered in the urine of this patient will be included by Dr. Watson in a separate report.

Reference

1. Waldenstrom, Jan: Studies in porphyria. Acta Medica Scandinavica, Supplement 82, Volume 92, 1937.

HISTORY OF MEDICINE IN BROWN COUNTY

Compiled by George B. Weiser, M.D.

(Continued from March issue.)

Physicians at Sleepy Eye

Dr. W. Town practiced in Sleepy Eye in 1873 and 1874. He ran a drug store for a time.

Dr. J. W. B. Wellcome, whose biography appears under the head New Ulm Physicians, practised in Sleepy Eye for a time.

Dr. Fred Wellcome studied medicine under the supervision of his father, Dr. J. W. B. Wellcome, and opened an office in Springfield in 1874. He later gave up the practice of medicine and engaged in the real estate and banking business in Minneapolis.

Dr. T. M. Marcellus, born in Canada, in 1852, came to the United States in 1866 and resided at Northfield, Minnesota, twelve years. He was a student at Carleton College, then went to the University of Michigan, where he graduated from the Medical School in 1878.

He located at Sleepy Eye where he practiced several years, then moved to Overton, or Charlottsville, Albermarle County, Virginia, in 1895. He died in 1908.

Dr. Harper M. Workman, born in Circleville, Ohio, 1858, graduated from the University of Chicago Medical School in 1880. He located at Sleepy Eye about 1880, having been sent there by the chief surgeon of the Chicago & Northwestern Railway, as surgeon for the construction gang. When the railroad was being built to Pierre, South Dakota, the division point was moved to Tracy in 1882, where he established his practice. He continued practicing his profession until his death, October 8, 1936.

Dr. Workman was first president of the village council of Tracy. He was a member of the Tracy School Board for twenty years; was president of the Council of the Minnesota State Medical Association for twenty years, to the time of his death, October 8, 1936, and was past president of the Association.

Dr. Workman took an active interest in his county and state societies; in both he was an indefatigable worker and a faithful servant.

Dr. Novious came from Sauk Center to Sleepy Eye in 1887. He was a partner of a Dr. Von Eschen.

Dr. A. P. Poaps, born in Montreal, Canada, in 1859, entered Kingston College of Physicians in 1877, then went to Bellevue Hospital Medical College, graduating in the spring of 1881. He located at Sleepy Eye in August, 1881, practiced there a brief period of time, and then moved to Los Angeles, California.

Dr. H. Wechsler practiced in Sleepy Eye in 1885.

Dr. Jacob B. Wellcome, Jr., son of Dr. J. W. B. Wellcome, graduated from St. Louis College of Physicians in 1890. He commenced the practice of medicine in Sleepy Eye the same year and continued there until the time of his death, January 3, 1935. He served as mayor and was local surgeon for the Chicago & Northwestern Railway.

Dr. James McPeek, graduate of Keokuk Iowa Medical School, 1889, practiced at Sleepy Eye for a brief period.

Dr. A. Franklin Strickler, whose biographic sketch appears under New Ulm physicians, located at Sleepy Eye in the year 1900.

Dr. Mary Strickler, wife of Dr. A. Franklin Strickler, was born in Dodge Center, Minnesota, in 1873. She graduated from the University of Minnesota Medical School and was associated with her husband in the practice of medicine at Sleepy Eye. After her husband's death she continued practicing until 1935, when she retired. She now resides at Medford, Oregon.

Dr. J. S. Kilbride, graduate of the University of Illinois Medical School in 1892, located at Sleepy Eye for practice of his profession. He later moved to Canby, Minnesota, thence to Worthington, where he resides at the present time. His son, Dr. E. A. Kilbride, is located at Worthington where he is engaged in the practice of medicine.

Dr. Ernst O. Pucklitsch, a graduate of Miami Medical College, Ohio, located in Sleepy Eye in 1894. He practiced there until 1898, when he moved to Cincinnati, Ohio, his former home. He was a member of the Brown County Medical Society.

Dr. N. C. Davis, a graduate of the College of Physicians and Surgeons, Keokuk, Iowa, practiced in Sleepy Eye in 1896. After one year he moved to Pipestone, Minnesota, where he had previously practiced for five years.

Dr. M. A. Kiefer, born at Beaver Falls, Minnesota, March 29, 1878, graduated from the University of Minnesota Medical School in 1904. He located at Sleepy Eye where he continued the practice of medicine until his death in 1931.

Dr. Gottfried Schmidt, born in Minnesota in 1871, graduated from the Minnesota Homeopathic Medical School in 1903 and located in New Ulm the same year. He moved to Sleepy Eye and engaged in practice there for several years, then moved to Lake City, Minnesota, where he continued practicing medicine until 1940. The State Board of Medical Examiners suspended his license for a period of five years for irregular practice.

Dr. A. P. Goblirsch, graduate of the University of Minnesota Medical School, 1925, served his internship at Ancker Hospital, Saint Paul, and one year of postgraduate work at Ancker Hospital.

In August, 1926, he located in Sleepy Eye where he has been engaged in the practice of medicine to the present time (1940).

Dr. William O. McLane and **Dr. Evelyn McLane,** both graduates of the Medical Department of the University of Minnesota, located at Sleepy Eye about 1930. The latter part of 1933 they moved to Jackson, Minnesota, where they reside at the present time.

Dr. J. L. Ryan, a graduate of Marquette Medical School, 1934, formerly of Snilsberg, Wisconsin, located in Sleepy Eye in 1934. He moved to Philadelphia in the year 1939, and is now taking a course in obstetrics and gynecology at the University of Pennsylvania (1940).

Dr. C. R. Senescal located in Sleepy Eye in 1932 and has been in practice there since that time.

Dr. E. W. Wohlberg, a graduate of the University of Minnesota Medical School, located in Morgan, Minnesota, for a brief period, then moved to Sleepy Eye in 1939. He is engaged in the practice of medicine there at the present date (1940).

Physicians at Springfield

Dr. Jacob C. Rothenburg, whose biography appears under the head of New Ulm Physicians, located there before locating at Springfield. He died in 1939.

Dr. Harvey A. Hitchcock settled in Springfield, Minnesota, in 1878. He was born in Courtland County, New York, studied medicine in Janesville, Wisconsin, and attended a medical institute in Cincinnati, Ohio. He practiced in Janesville, Wisconsin, and Morristown, Minnesota, before coming to Springfield. He moved to California in 1881.

Dr. Thomas Sullivan, born September 7, 1857, was one of the early physicians of Springfield. A graduate of the University of Toronto, 1881, he first located in Sharon, Pennsylvania, then moved to Springfield in 1883. He practiced medicine at Springfield until the time of his death, November 9, 1905. He was a member of the school board for many years.

Dr. J. S. Schrader, born March 9, 1858, in the County of Niagara, New York, received his preliminary education at Clarence Academy, New York. He graduated from the Medical Department, University of Michigan, in 1885. In 1901 he spent six months in postgraduate work in Vienna, Berlin, Paris and London.

He commenced the practice of medicine in Hadley, Michigan, where he remained six months, then located at Delano, Minnesota. He practiced there for fifteen years, then moved to Springfield and formed a partnership with Dr. J. C. Rothenburg, which was dissolved in 1932. From 1932 to 1940 he practiced at Hollendale, Jordan and Marietta, Minnesota, then returned to Springfield in the early part of 1940. During his medical career he has served as a member of the Pension Board at Buffalo, Minnesota, also as a member of the State Board of Medical Examiners for several years.

Dr. Cleveland Friederichs, born October 29, 1889, at Elgin, Iowa, graduated from the New Ulm high school in 1904. He received his M.D. degree at Northwestern Medical School, then located at Springfield in the summer of 1909. He practiced there until his death, October 24, 1911.

Dr. W. G. Muessle, born in 1889, graduated from the University of Minnesota in 1913. He located at Springfield about the year 1916, and has been in continuous practice there ever since.

Dr. W. A. Meierding, a native of Brown County, Minnesota, graduated from the University of Minnesota Medical School in 1907. After graduation he became a member of the medical staff of the State Hospital, Fergus Falls, 1909-1910. He located at Buffalo, South Dakota, 1910-1911; then at Springfield, Minnesota, 1911-1917. He was a captain in the World War, 1918-1919. He located in New Ulm in 1919, and served as secretary of the Redwood-Brown Medical Society from 1920 to 1934. In 1934 he retired from the practice of medicine and moved to Norco, California, where he now resides.

Dr. Edwin John Wohlrabe, born November 16, 1899, at Truman, Minnesota. He graduated in 1925 from the University of Minnesota Medical School, and served an internship of eighteen months at Philadelphia General Hospital. His first location was in New Ulm, August, 1926. In December of that year he moved to Springfield, where has been in continuous practice ever since.

Dr. Clarence F. Wohlrabe, born December 28, 1897, at Truman, Minnesota; graduated from the Mankato high school, then entered the University of Minnesota Medical School, graduating in 1924. He finished his internship in 1925, and opened an office for the practice of medicine in Young America in December. He formed a partnership with his brother, Edwin J. Wohlrabe, at Springfield in 1926, continuing there till 1933. He then moved to Minneapolis where he practiced until 1939. He is now located at North Mankato, Minnesota.

Dr. J. Emory Frank first located in Springfield about 1935, then moved to Marshall, Minnesota.

Dr. C. B. Abbott located at Springfield, Minnesota, about the year 1930, and has been engaged in the practice of medicine there to the present date (1940).

Dr. E. R. Penk, who came to Springfield in 1937, is still engaged in the practice there.

Physicians at Comfrey

Dr. Joseph A. Prim, graduate of the University of Minnesota Medical school, 1899, located at Comfrey where he practiced for several years. He moved to Minneapolis where he resides at present, practicing medicine. He was succeeded by Dr. H. D. Herron.

Dr. H. D. Herron practiced medicine at Comfrey until 1916, when he was succeeded by Dr. Arthur W. Eckstein.

Dr. Arthur W. Eckstein was born in New Ulm, and graduated from the New Ulm high school in 1906. He graduated in pharmacy at the University of Minnesota in 1908; in medicine at the Northwestern Medical College, Chicago, in 1912.

He first located in St. Cloud, then moved to Holdingford, where he practiced from 1914-1916. He practiced at Comfrey from 1916 to 1928, then located in North Mankato where he resides at the present time (1940).

Dr. F. C. Gibbon, who succeeded Dr. Eckstein at Comfrey in 1928, graduated from the University of Minnesota Medical School in December, 1926, and served his internship at the Minneapolis General Hospital, 1927. He first located in Springfield but moved to Comfrey in December, 1928. He has been engaged in the practice of medicine there ever since.

Physicians at Hanska

Dr. Douglas F. Wood, a graduate of McGill University, Canada, was the earliest practicing physician at Hanska, where he remained until 1909. He was appointed by Governor Johnson as a member of the State Board of Medical Examiners. After leaving Hanska he took postgraduate work in Vienna to specialize as an aurist and oculist. He practiced his specialty in Minneapolis until his death in 1934.

Dr. S. P. Seaburg located in Hanska in 1908 and remained their four years.

Dr. Dahl, graduate of a medical school in Norway, practiced at Hanska for a brief period of time. He then moved to North Dakota.

Dr. Mathias Sundt, born in Norway December 10, 1882, graduated from the Medical School, University of Minnesota, in 1909. He located in Hanska, where he was engaged in the practice of medicine until 1920, when he moved to Minneapolis, associating himself with the Sivertsen Clinic.

Dr. E. Borgeson located in Hanska about the year 1921, then moved to Minneapolis. Graduated from the University of Minnesota in 1920.

Dr. O. F. Pederson located in Hanska about the year 1923. He practiced medicine there until 1932, when he was succeeded by Dr. W. Donald Graham.

Dr. E. G. Olmanson, graduate of the Northwestern Medical School, located in Hanska for a brief period, then moved to Saint Peter, Minnesota.

Dr. H. Mortensbak, graduate of the University of Minnesota Medical School, 1934, located in Hanska and is practicing medicine there at the present time (1940).

(To be continued in May issue.)

FREEDOM TO THINK

We all pass through a stage of thinking that our generation in its day was a little wiser than the one that followed it. In this we are doubtless very often wrong, but I believe that my generation of medical students was more alive to the uses and interests and educational value of the debating and scientific criticism than the generation that came between the two great wars. Make every use of your opportunities here. Learn to speak in public and test for yourselves the mental stimulus of logical dispute.

You cannot afford to school yourselves in science alone. You must know something of men and movements, too. You must qualify for citizenship as well as for your baccalaureate or doctorate in medicine. Whatever form our future state may take the doctor will always be a key man in its organization. He must earn his freedom to think and to advise and must seek by every means in his power to become, like Grenfell of Labrador, like Balzac's "Country Doctor," like many a good physician who dies unsung after an arduous life devoted to the community, a man of ideals, a man of judgment and a man of action.—JOHN A. RYLE: *Cambridge University Medical Society Magazine,* Michaelmas Term, 1940.

President's Letter

NATIONAL DEFENSE

TODAY the man on the street and in the office, the worker in industry and the worker on the farm, the professional man and the merchant, all talk the same language and about the same thing—National Defense.

Those of us who had a part in the first World War know how intimately each one was gradually drawn into the maelstrom and how each family in the land was affected one way or another at some time during those trying years.

That the men of medicine are doing their share without fear or favor this time as in the past goes without saying. The national emergency overshadows any feeling of personal loss or gain. We are conscientiously producing, through our culling by examinations of selectees, volunteers and National Guard, as fine a manpower for the Army as can be found in any country. Serving without pay as local draft board examiners, members of Medical Advisory Boards and draft appeal boards, we are spending our time as well as our money to further the cause. In induction centers we find men working for small pay, $15.00 a day, who, if they spent the same amount of time in their private offices, would be compensated many times more for this time. They are doing their part.

About two hundred of the Medical Reserve Corps in our state have already been called for active service. A hundred and fifty more will be in active work in camps and elsewhere by this coming summer while those who are members of the National Guard are already called to duty. These men have, in most instances, left active practices. They have not been found wanting.

Many Departmental Advisory Committees are either headed out by or have physicians as active members on them. The American Medical Association, through its activities, has correlated various departments and is coöperating closely with the War Department.

In all these and many more ways the medical personnel of the country is playing a very important part in the emergency. When history is written in the future, it will, I am sure, show in good light the unselfish attitude of the medical profession.

Each of us should be proud to be a part of this history-making, doing our share to help establish again on an even keel, world economy. It cannot be said now nor will it ever be said of us that we were dilatory in the help which we have given to our government.

B. J. Branton, M.D., *President,*
Minnesota State Medical Association.

EDITORIAL

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BUSINESS MANAGER
J. R. BRUCE

Volume 24 APRIL, 1941 Number 4

CLINICAL-PATHOLOGICAL CONFERENCE

IT was the abundance of autopsy material that made Vienna the Mecca for years of the physicians in this country. Known by the Germans as "Die Erklarung," the autopsy answered many a question which had puzzled the clinician. The autopsy is just as important today as it ever was and the recognition of this fact by the profession and the laity alike has accounted for the high medical attainment achieved in this country. It is a number of years since the profession in this country has needed to go abroad for medical study.

The most valuable meetings which the physician located in the large centers attends today are the clinical-pathological conferences. Here the clinical findings are correlated with those found at autopsies and the opportunity is afforded to present every phase of the disease encountered. This fact is not as generally recognized as is should be.

In order that our readers not located in the larger centers of population may share to some degree the benefits derived from such a conference, we are planning to publish again each month a report of at least one case presented at one of the conferences held in the Twin Cities, this time from that held at the Minneapolis General Hospital. The editor would appreciate an expression of the reaction of our readers to the publication of this report. In this way only can we determine whether its continuation is worth the effort.

FOURTH OF JULY INJURIES

WHY mention the Fourth of July in April? Because the subject of Fourth of July injuries is suitable for discussion any day in the year. Perhaps July 4 comes so far in advance of the term of the legislature that everyone has forgotten the injuries from the previous Fourth of July and no one remembers to submit a bill for statewide prohibition of fireworks. We sometimes pass our laws if and when we think about them.

Minnesota should have a state law prohibiting sale and possession of fireworks except for authorized public celebrations. We shall have the law in our state when public opinion demands it. There is evidence throughout the country that public opinion is predominantly in favor of eliminating the needless injuries—some of them fatal—which follow Fourth of July accidents. It only remains for public opinion to make its demand sufficiently felt. What is more fitting than that the medical profession should start the movement to obtain this beneficial legislation in Minnesota.

Here are some of the facts. Injuries from Fourth of July accidents constituted enough of a problem at the turn of the century so that the

Journal of the American Medical Association made yearly summaries of the number and nature of these accidents from 1903 until 1916. The reduction in injuries became so marked that the tabulation was discontinued. In recent years these injuries have been on the increase, several thousand being reported each year, this representing probably only a small percentage of the total number. The tabulation by the American Medical Association has, therefore, been resumed.

In 1937, there were twenty deaths reported due to burns and explosions incident to Fourth of July celebrations. In 1938, the number was eighteen and in 1939 it showed a reduction to thirteen. This was due to the improvement in the figures reported in Pennsylvania. In 1938, Pennsylvania reported 1,702 Fourth of July injuries and headed the states with six deaths. A state law barring fireworks in Pennsylvania became effective in 1939 and injuries were reduced to 85, and no deaths were reported. This is an outstanding example of the effect of such a state law.

Other figures could be given to show the salutory effect of laws and ordinances outlawing fireworks. In Saint Louis, injuries were reduced from 195 in 1938 to 76 in 1939 by such an ordinance. A perusal of the number of injuries reported from Iowa, Wisconsin, Michigan, and New Jersey, which states are numbered among the nine having prohibitive legislation, shows lower figures in these states than in Minnesota, in spite of prohibitive ordinances in the Twin Cities. Both Minneapolis and Saint Paul have ordinances prohibiting the sale or possession of fireworks within the city limits. For ten days preceding the Fourth of July each year the boundaries of both cities are demarcated by our country's flag flying from a road-side counter selling fireworks. The inconvenience of making a trip to the outskirts of the city doubtless lessens the possession of fireworks and consequent accidents within the city limits, but how ridiculous the situation.

Public opinion within a Minnesota city sufficient to support a city ordinance of this sort is indicative of general public opinion throughout the state and, of course, widespread public approval of such a prohibitive law is essential in order to expect satisfactory enforcement. Local prohibitive ordinances in the Twin Cities have doubtless kept the state as a whole from presenting too grim a picture. Although no deaths have been reported in Minnesota following these seasonal accidents during the years 1937, 1938, and 1939, it is impossible to say how many have been prevented by injections of lock-jaw serum. The report of 146 burns and lacerations, one case of loss of vision, three additional eye injuries, and one lost member from Fourth of July celebrations in 1939 suggests a much larger total number of accidents throughout the state.

Many elements in society should be willing to join forces, as is being done now in Massachusetts, in obtaining legislation to ban fireworks throughout the state, except for properly supervised public exhibitions. Societies for the prevention of blindness, municipal authorities, fire chiefs, physicians and particularly all parents should be only too willing to support legislation to eliminate that dread of accident which has ever been an accompaniment of the Fourth of July.

CHARLES WARDELL STILES

TO many people, especially those who are not physicians, the news of the death of Dr. Charles Wardell Stiles on January 24, 1941, will mean nothing, for his name was never published in the daily press and he was never awarded any distinction that would have placed him even momentarily in the limelight. He was just one of the host of scientific workers who plod away at their appointed tasks, caring nothing for public acclaim and not raising as much as a finger for notoriety.

He was one of our most distinguished helminthologists. It was his pioneer work in hookworm disease that laid the scientific basis for the splendid public health program which has gone so far in the eradication of that baleful condition. His original contribution under the modest title of Report on Hookworm Disease (Uncinariasis) in the United States in 1903 first brought the subject to attention. The facts he presented attracted the attention of the Rockefeller Foundation and he served as scientific secretary to the Rockefeller Commission for the Eradication of Hookworm Disease from 1909 to 1914. The South owes him a tremendous debt.

While his work was closely tied into that of clinical medicine he never took a medical course.

After two years in Wesleyan University he spent four years in Paris, Berlin and Leipzig, receiving his A.M., Ph.D., from the University of Leipzig in 1890. His chief connection thereafter was with the United States Public Health Service. He taught medical zoölogy for forty years in Johns Hopkins, was U. S. delegate to the International Zoölogical Congresses for a number of years and served as secretary, from 1898 to 1936, to the International Commission on Zoölogical Nomenclature. He was a voluminous writer, almost exclusively on parasitic diseases, and was a member of many American and foreign scientific associations. His death is a severe loss to scientific medicine.

GILBERT COTTAM

AMERICAN ACADEMY OF PHYSICAL MEDICINE

The American Academy of Physical Medicine will hold its Nineteenth Annual Meeting and Scientific Medicint will hold its Nineteenth Annual Meeting and Session on April 28, 29, 30, 1941, in New York, with headquarters at the Hotel Pennsylvania, where lectures, symposia, clinical papers, motion pictures, and the exhibits will be presented. Clinics will be held at the Medical Center, New York Orthopædic Hospital, Post Graduate Hospital, and the Skin and Cancer Hospital. There will be an evening session at the Academy of Medicine Building and a banquet at the Hotel Pennsylvania.

Physical medicine in relation to general medicine and the specialties will be the underlying theme of the topics under discussion. These include new developments in electrotherapy, electro-surgery, radiation therapy, hydrology, physical education, military medicine, aviation medicine, and laboratory reports on related investigation.

The sessions are under the direction of Harold D. Corbusier, M.D., Plainfield, N. J., President; Herman A. Osgood, M.D., Boston, Secretary; Fred H. Albee, M.D., New York, Chairman of the Committee on Arrangements; William D. McFee, M.D., Boston, Chairman of the Committee on Program; William Benham Snow, M.D., New York, Chairman of the Committee on Clinics; and Franklin P. Lowry, M.D., Newton, Mass., Chairman of the Committee on Exhibits.

All members of the medical profession and those of related interests are invited to attend the scientific program. There will be no registration fee. Address inquiries to Herman A. Osgood, M.D., Secretary, 144 Commonwealth Avenue, Boston, Massachusetts.

CORRESPONDENCE

Baudette, Minnesota

To the Editor:

This may be of interest to you: I have just returned from a 19,188 mile plane trip. Leaving Fargo, N. D., December 1, I flew to Manila, Philippine Islands, to visit my father, Dr. H. E. Stafford, who has retired and now lives in Baguio, P. I. I found that he has Buerger's disease, and wanted to see him before it was too late. It was my Christmas present to him, and quite a surprise, for he did not know anything about my plans until I wired him from Guam Island. The transpacific flight was quite interesting, though I was marooned for three days on Wake Island, waiting for a couple of typhoons to get out of the way, and also, on the third day, we took off, only to return in half an hour on account of engine trouble.

The Islands are frankly quite worried about Japan. Guam is pitifully unfortified, though at Midway, considerable work is being done to fortify the island and make a plane base out of it. Similar work was just starting at Wake Island. As we see by the papers, Guam is finally getting the money for defense work. Japan, for years, has quite successfully hoodwinked the United States out of any defense program, along with our misplaced economy-spending programs of the past ten years. The Filipino is at last casting longing glances at the United States, though he still kids himself a la independence.

Incidentally, I was born out there, way back when, and this happens to be my first visit to Manila in fifteen years, and the first visit to Baguio in twenty-two years. I succeeded in taking about 700 feet of colored movies, most of which came out on top. No movies or photography with a camera can be taken while on the Pan-American Clipper—Navy regulations. And absolutely ditto no on Wake and Midway Islands. I went through the Navy hospital at Guam. They have a lot of amebic liver abscesses and tuberculosis is on the rampage. The boys are doing good work there. I met a Minnesota graduate, but cannot remember his name. Both Midway and Wake have Pan-American medicoes, good men, military field equipment, and are within twelve to thirty-six hours from a hospital by airplane (Honolulu). Wake Island, size of about thirteen blocks, has a current population of twenty-seven, no women. The boys sadly need anaphrodisiacs.

Sincerely,

February 27, 1941 CHARLES C. STAFFORD

Health and National Defense

The need of national defense reqnires a strengthening and broadening of the entire industrial health program all along the line from private industry to local, state and federal jurisdictions. In this significant period of re-armament, during which our chief defense will be our industrial skill, let us be sure that we place first on our list the health and safety of our industrial workers.—L. D. BRISTOL, M.D., Jour. A.M.A., Oct. 12, 1940.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association
George Earl, M.D., Chairman

INSURANCE OF THE EXPENSE OF MEDICAL SERVICE*

WENDELL A. MILLIMAN

NOTE—*Mr. Wendell A. Milliman is Associate Actuary of the Equitable Life Assurance Society of the United States. This article appeared first in the 1940 Transactions of the Actuarial Society of America. It is reprinted here through the courtesy of the author and of the Actuarial Society because prepaid medical service and medical expense insurance are of great current interest to all physicians, and also because this is the first authoritative analysis by a recognized actuarial expert to come to the attention of the Committee.* —THE EDITORS.

CONSIDERABLE literature concerning the subject of "health insurance" and the cost of medical care has grown up during the past few years, indicating the increasing public interest in the problems created by the heavy and unpredictable incidence of the cost of medical care. Most of the writers on this subject have approached the problem from the standpoint of either the social economist or the physician. The typical conclusion of the social economist is that the faults of our present system of distribution of medical services can be cured only by the adoption of a program of compulsory "health insurance." The physician normally regards any proposal of compulsory "health insurance" as a threat to the very foundation of sound practice of medicine. Between these two violently opposed viewpoints has gradually developed the idea that a system of voluntary insurance of the expense of medical service can be developed without disturbing the present profession relationship between patient and physician. The importance of this viewpoint is illustrated by the fact that during 1939 Connecticut, Michigan, New York, Pennsylvania and Vermont enacted laws permitting the organization of nonprofit corporations to operate medical service plans on a prepayment basis.[1] The author does not wish to use this opportunity to quarrel with either of the extreme viewpoints, or to act as a proponent for the middle course. In this article it is hoped to survey in an objective manner some of the developments of this middle course, with particular emphasis on those aspects which appear to involve elements of insurance or with respect to which insurance experience should prove of value in indicating desirable action. Space limitations obviously prevent full discussion of all of the aspects of the many problems of public health and medical economics that are touched upon in this paper. Equally obvious is the author's lack of qualifications to discuss all of these many and varied aspects. The reader's indulgence is therefore requested if, in the process of approaching these problems from the standpoint of insurance, conclusions are reached which are at variance with those which would result from other approaches.

The recent widespread development of hospital expense insurance through the medium of nonprofit hospital associations, through group insurance policies, and through individually issued policies, has increased the interest in the voluntary insurance approach to this problem. The insurance of the expense of physician's services is apparently being developed along similar lines, i.e., by nonprofit associations, through group insurance, and through individually issued policies.

Insurance of medical expenses is not an entirely new idea in this country. Aside from the extensive benefits provided under workmen's compensation coverages, insurance companies have offered limited benefits for some time, and in recent years there has been a tendency to

*Unless otherwise indicated by the context, the term medical service is used in this article in a restricted sense to include only the services of physicians.

broaden the scope of such coverages. Personal accident and health insurance policies have for many years provided limited surgical indemnity benefits. In 1930 or 1931 several companies offered, at an extra premium, an optional additional benefit in personal accident insurance policies, consisting of a very liberal medical expense indemnity provision under which all hospital and medical expenses incurred by the policyholder in the treatment of his injuries are insured, subject only to an aggregate limit with respect to each accident, of $500 or some greater sum.[2] This benefit is quite generally offered today. Since early in 1938 many companies writing group insurance have offered a surgical insurance benefit as an optional additional benefit to be included in group hospitalization policies. Further reference to this benefit will be made later.

Besides this activity of insurance companies a considerable amount of experimentation has been undertaken by various other groups interested in the problem of providing medical service.[3] These experiments are extremely varied both in details and in basic philosophy. Several plans are briefly described below in order to illustrate the range of this variation.

The plan of the Brattleboro Memorial Hospital Association is practically unique in that it is limited to the insurance of the expenses of serious illnesses. Despite its relatively recent origin —it was organized in 1927—it is one of the pioneer organizations in this field. The association insures hospital expenses, and surgeons' fees, in excess of the sum of $30 for each illness and subject to a maximum benefit ranging from $150 to $300 for illness requiring surgery, depending upon the premium rate charged the member, and one-half such maximum if no surgery is required. The annual premium rates per individual are shown in the accompanying table.

	Maximum Benefit		
	$150	$200	$300
Adult subscribers (including husbands and wives of subscribers)	Per person $5.00	Per person $6.66	Per person $10.00
Adult dependents (other than spouse of subscriber)	3.90	5.80	7.80
Children, ages 16 to 21	5.00	5.00	5.00
Children under age 16	3.00	3.00	3.00

The association has no contracts with the surgeons who render service, but since all such service must be rendered in the Brattleboro Memorial Hospital, reasonable control over the surgeons' fees is exercised. The membership of the association is quite restricted due to the size of the community in which it operates. At April 1, 1940, there were 3,359 persons insured by the association.

Another plan which involves elements of insurance is the King County Medical Service Bureau (Seattle, Washington) which was established in May, 1933, under the sponsorship of the King County Medical Society. It offers medical, hospital and nursing service for a period not exceeding twenty-six weeks with respect to any one illness or accident, including occupational accidents. The plan permits the patient free choice of physician within the group of 450 participating physicians. The physicians are reimbursed upon a fee-for-service basis, the payment being subject to pro-rata reduction if necessary to preserve the solvency of the organization. Membership is limited to employed persons who enroll in minimum groups of six, representing at least 75 per cent of those eligible for enrollment. There are at present approximately 40,000 persons covered by the plan. The premium rates vary from $1.25 to $3.50 per month per employe, depending upon the compensation rate for the industry.

The foregoing organizations insure, to a greater or lesser extent, the cost to the individual, but do not disturb to any material extent the present, almost universal, basis of payment to the physician for the services he renders. This basis of remunerating the physician is commonly described as the fee-for-service basis. The arrangement included in the King County plan for pro-rating such fees is known as the unit disbursement system. Employment of a physician, or physicians, by a central agency on a salary basis, or payment to the physician of a fixed annual "capitation" fee for each potential patient on his "panel" are the two other methods widely used to furnish medical service at a fixed annual price to the consumer. These methods do not involve insurance in the normal sense,

although it will be seen that the physician must, within limits, bear the burden of large demands for service, or benefit from light demands for service.

The Ross-Loos Medical Group, operating in the Los Angeles area, is an outstanding example of the employment of physicians on a salary basis for the purpose of furnishing medical service to subscribers at a fixed cost. The group was organized in 1929 as a clinic to provide to employed subscribers complete medical and surgical treatment, hospitalization, and, to a limited extent, medicines and supplies. In addition it provides similar services to dependents of subscribers at substantially reduced rates. The clinic is operated as a partnership of eighteen physicians, and has a total staff of seventy-five full time physicians. There were, at December 31, 1939, 22,983 subscribers. There were in addition approximately 50,000 dependents of subscribers entitled to service at reduced rates.

The cost to employed subscribers enrolled on a group basis is $2.50 a month while the cost to subscribers enrolled on an individual basis, with direct payments of premiums, is $3.00 a month. Dependents of subscribers are entitled to services other than hospitalization at reduced charges. (A dependent is defined as one who is permanently and completely dependent upon the subscriber for support, who resides in the same house, and who is related to the subscriber by blood or marriage.) The reduced charges for dependents are $.50 for each office call, $1.00 for each residence call, and other small charges for special procedures, such as $25 for a major operation.

The employment of physicians on a panel system is illustrated by the plan of the City Central Committee of the International Workers Order of New York. Through its medical department this fraternal society has since 1930 provided medical service to members (and their families) at an annual cost of $2.70 per year for single members and $4.20 for families. A family includes husband, wife, and children under eighteen. The medical service provided is that of an annual physical examination, office and home calls of a general practitioner, and services of specialists at reduced rates. The general practitioner, or district physician, is entitled to charge minimum fees for after-hour calls, for minor surgery, and for obstetrics. The annual capitation fee paid by the Order to the district physician is $1.80 per single member, and $3.00 per family. No additional remuneration, over the fees paid directly by members, is paid to the specialists. At December 31, 1939, approximately 15,000 members were participating in the Medical Department, so that, including dependents, approximately 60,000 persons were entitled to the benefits of that department.

Numerous instances could be cited of the provision of complete medical service for a group of employes through the employment of a physician, or physicians, by the employer. Since these plans normally entail no expense to the potential patient for such medical service, they have no direct bearing upon this discussion. There are also numerous instances of provision of medical service for relief groups upon plans based upon new methods of compensating physicians for their services. These experiments have illuminated some of the administrative problems which would be involved in any community-wide voluntary plan, and reference is made in a subsequent section to some of the experience with such problems.

The various plans briefly outlined above indicate the great variation in the plans of medical expense insurance which have been proposed or adopted. As previously indicated, group insurance has been extended into this field to a limited extent. On the other hand, there are numerous other organizations actively interested in establishing comprehensive plans of insurance of medical expenses, or of otherwise distributing medical services at a fixed annual cost. Both types of approach will be discussed in this paper with particular emphasis on these latter comprehensive plans.

The interest of those seeking a workable solution to this problem is usually occasioned by some one or more of the following desires:

1. A desire to eliminate the uneven burden of the cost of medical care.

2. A desire to find a workable substitute for compulsory health insurance.

3. A desire to improve the quality of medical service.

The purpose of the present paper is to explore some of the difficulties in the application of the insurance principle to this problem. Many of these difficulties grow out of the conditions im-

posed by the last two of the above objectives. For instance, the desire to find a workable substitute for compulsory health insurance imposes the necessity of providing a benefit for the lower income groups at moderate cost without resorting to taxation and without reducing the average cost of medical service rendered to moderate and high income groups. It should be noted here that it is traditional with the medical profession to charge for medical service in proportion to the patient's ability to pay. To the extent that the physician is willing to accept smaller fees for his services from persons of smaller incomes, the idea of charging different premiums to persons of different economic circumstances does not theoretically interfere with the application of insurance principles, although it obviously does introduce new and substantial administrative difficulties.

The desire to improve the quality of medical service introduces the idea of preventive medicine in the form of periodic health examinations and early visits to the physician in the event of illness. There can be no question as to the social desirability of more widespread use of periodic health examinations. However, the very fact that the cost of health examinations does not impose an unpredictable financial burden upon the individual takes it outside of the range of insurance as such. Nevertheless, it would seem to be entirely sound to include health examinations in a plan of medical benefits on the grounds that it is a service which can be included without endangering the safety of the plan. The difficulties arising from insurance of the first few visits of a physician will be referred to later.

A fundamental characteristic of an insurable hazard is that the frequency of the happening of the event which is the subject of the insurance should be subject to prediction within reasonable limits of error. A necessary corollary is that the happening of the event must not be subject to the control of the insured individual, or that there must be a strong incentive or normal desire on the part of the insured individual to avoid the happening of the event which is the subject of the insurance. It is equally necessary that the insured event shall be susceptible of precise and easily understood definition.

If the physician is remunerated upon a fee-for-service basis, then, in a sense, both the physician and the patient are insured individuals. While theoretically the frequency of conditions *needing* medical service is not within the control of the individual, it is obvious that the frequency of conditions for which medical service is *sought* is to a very considerable extent subject to this control. The extent of this control varies inversely with the seriousness of the condition needing medical service. Once medical service has been sought with respect to a condition, the volume of service becomes largely subject to the control of the physician, although it is still subject to some control by the individual.

It is apparent that the expense of the first few visits of a physician with respect to an illness or injury is, in the above sense, an uninsurable hazard. Conversely, the inclusion of such benefits in a plan imposes the necessity of strict supervision or some other control in order to minimize, or eliminate, the financial effect of too frequent visits to the physician with respect to minor, or nonexistent, disorders. It thus appears that the event must be limited and restricted if it is to be removed from substantial control by the insured individual or the physician. These limitations and restrictions immediately present difficulties in the matter of obtaining precise and easily understood definitions. The payment of the physician on a caption basis automatically safeguards the finances of the "insurer" and obviates the necessity of such limitations and restrictions. However, if the average volume of service demanded by the patient under such a plan is substantially in excess of that contemplated in the formulation of the plan, new problems arise.

In the following section a few of the practical problems involved in formulating a comprehensive plan of medical expense insurance are discussed.

1. The growing use of x-ray for diagnostic purposes and the temptation to the physician to use such service as a substitute for his own diagnostic skill mark this type of service for special attention. It is probably the most subject, of any service, to an increase in demand if no deterrents to its unlimited use are devised.

2. Obstetrical care is obviously a benefit which is subject to the control of the individual (within certain age and sex limitations), and hence is not strictly an "insurable" hazard. The question as to whether or not a plan can safely

include obstetrical benefits is intimately related to the conditions of enrollment of subscribers. If a representative cross section of the population were included in the plan, the cost of such care would be predictable. This condition is reasonably met when a group of employes, or employes and their dependents, are enrolled, providing a minimum participation of, say 75 per cent of those eligible is required. However, subscribers enrolled on an individual basis would undoubtedly show considerable self-selection with respect to this benefit, even though careful medical selection were exercised. The effect of this selection can be postponed, and perhaps minimized, by requiring a waiting period before obstetrical benefits are available. It would also seem that with respect to those enrolled in any year this self-selection would tend to disappear within a few years after enrollment. (If a waiting period for obstetrical benefits is used, due allowance should be made for this fact in evaluating the experience of the plan, and some reserve should be maintained for the delayed cost of obstetrical benefits.)

3. In pediatric care, perhaps more than in the care of adults, it is difficult to divorce preventive from therapeutic service. The volume of preventive care in the early years of life undoubtedly has a very marked relationship to the frequency and severity of subsequent illnesses, and the need for therapeutic service. It should be noted that according to accepted standards of proper medical care the frequency of visits to the physician for preventive care is very high in infancy and decreases with advancing age. Here again, attention should be called to the previous remarks concerning the "insurable" character of health examinations.

4. Refraction of eyes for individuals with impaired vision is of a recurring and predictable nature. The comments with reference to the "insurable" character of annual health examinations apply with equal force to eye refractions.

5. Psychiatric care, treatment of tuberculosis and of alcoholic or drug addiction may require very extended service, but such service is in many instances available through public institutions at no expense to the individual. The heavy burden of the cost of such service, when obtained through a private practitioner, makes it a desirable subject for insurance. However, to the extent that adequate service is provided at public expense it would seem unnecessary to insure it. The decision with reference to inclusion, or exclusion, of the expense of medical care for these conditions need not necessarily be the same for each of them.

6. The services of a specialist for a consultation normally command a higher rate of compensation than do ordinary visits of a specialist. Any such expensive service which can be ordered by the attending physician without direct financial burden upon the patient, and without any objective criterion as to what circumstances furnish adequate justification for requiring the service, appears to strain the requirements of an insurable hazard.

7. Laboratory service may be furnished by a commercial laboratory not operated by a physician, or may be furnished by a pathologist. The pathologist is a licensed physician, and hence can perform a broader function than the lay laboratory operator, but naturally commands a higher rate of compensation. The decision as to which type of laboratory service to include would be influenced by the sponsorship of the insuring organization. An organization sponsored by physicians would naturally emphasize the professional character of laboratory service furnished by pathologists, whereas a consumers' coöperative would emphasize the lower cost of the commercial laboratory.

If the furnishing of medical care fully met the criteria of an insurable hazard, which were mentioned earlier in this article, there would not be any necessity for administrative controls. The fact is that both physician and insured can, and, do, influence the quantity of medical care rendered. Perhaps this weakness is characteristic of all types of "insurance" which involve disability, regardless of whether the benefit is indemnity for loss of time, indemnity for cost of hospital service or indemnity for cost of medical care, the difference being one of degree, not of kind. In those plans where the physician is paid an annual capitation fee this fact is of no direct financial importance to the "insurer" since the risk of fluctuation in volume of service is shifted to the physician. This system removes the incentive for the physician to render unnecessary service, and gives him an incentive for discouraging unnecessary demands for service by patients on his panel. By the same token it places great confidence in the professional conscience

of the physician to ensure the rendering of adequate service under these conditions.

When the physician is paid on a fee-for-service basis this automatic protection of the finances of the insurer is absent. It is common for organizations using this basis of compensation to include in the physicians' contracts an agreement to accept pro-rata payment of fees from the funds of the organization available for such payment, i.e., what we have termed the unit disbursement system. But obviously no such organization can continue to operate successfully if the payments to conscientious, honest physicians are substantially reduced in order to pay large amounts to those physicians who make unwarranted claims upon the common fund.

Numerous types of control have been suggested. All are based upon a continuous, or periodic, examination of the individual physician's pattern of practice. This examination may be made by an officer of the insurer, by a committee of physicians, or by purely statistical analysis. When unwarranted claims are indicated there may be merely an adjustment of those claims, or stronger disciplinary action such as cancellation of the physician's contract.

Control based solely upon separate examination of the records of individual physicians, whether by an officer of the insurer or by a committee of physicians, has proven unsatisfactory. Statistical measures of the relative frequency of treated patients, the relative average number of visits per patient, and the relative distribution of types of service have been used for several years in the administration of medical relief in Essex County, Ontario, Canada.[4]

This plan provides for distribution of per capita allowances from the Government of Ontario to the participating physicians upon a fee-for-service basis under the unit disbursement system. The fee schedule provides $2.00 for office calls, $4.00 for night home calls and $3.00 for other home calls. For each month the number of patients treated by each physician is compared with the number of "expected" patients determined from a formula fitted to the experience of the month by the method of least squares. A similar comparison is made of the number of visits by each physician, substituting in this calculation the "expected" number of patients, plus the probable error, if less than the actual number. The total of fees claimed is then adjusted if it exceeds the average fee multiplied by the allowed number of visits. Presumably, consistent excess deviations in the practice of any physician are brought up for review and possible disciplinary action.

The problem of supervising doctors, and disciplining those found to be imposing upon the insurer, is a familiar one in workmen's compensation insurance. It has been at least partially solved in New York by placing the responsibility for such supervision upon the medical profession, through the medium of a committee appointed by the state medical society, as opposed to placing that responsibility in a non-professional body such as the insurer. The experience under this law makes it appear that the medical profession does not welcome supervision by any outside authority, but is reasonably conscientious in self-discipline when the proper mechanism is available.

To the extent that the medical services covered are really insurable, these administrative controls should be unnecessary. Probably the most insurable medical services are surgical procedures, on the one hand, and medical services in treatment of injuries received in an accident, on the other hand. It is within these fields that insurance companies have found it most feasible to enter the field of insuring the cost of medical expense.

Probably the most experimental large scale entry of insurance companies into this field was the introduction on a group insurance basis, early in 1938, of a surgical insurance benefit not confined to accidents. Group surgical benefits were introduced simultaneously with an extension of group hospitalization benefits to permit inclusion of dependents, i.e., wife and children under eighteen years of age. The benefit was first limited to surgical procedures performed in a hospital, but was later liberalized so as to insure the cost of surgery performed either within or outside a hospital. The insurance is a reimbursement benefit subject to maximum amounts of reimbursement with respect to various types of operations. These maximums were fixed to roughly represent the standard minimum fees which could be expected in an average industrial community, and are those widely used at the present time by insurance companies in general. There are variations from this schedule, both as to the inclusion or exclusion of individual

items and as to the maximum amounts of indemnity payable for various operations. In addition, the benefit will be issued providing lower schedules of indemnities, all amounts being reduced proportionately.

Some companies limit the benefit to the specified operations, while others make provision for non-scheduled operations. Such provision is usually limited to cutting operations, and in some instances to cutting operations performed in a hospital. These restrictions arise from the necessity of clearly defining the insured hazard. The line of demarcation between surgical operations and other medical procedures unfortunately is not as sharply and easily defined as is commonly believed. This vagueness is illustrated by the following definition of a surgical operation included in Webster's New International Dictionary.

"A procedure on the living body, usually with instruments, especially for the purpose of restoring health or alleviating suffering."

Since the majority of conditions requiring hospitalization also require some surgery, this problem was of no great moment so long as only hospitalized operations were covered. But when procedures performed in the physician's office or the patient's home were covered, the problem of distinguishing between minor, non-cutting surgery and non-surgical procedures became important.

No adequate statistical basis was available to determine the appropriate rates either for the hospital limited surgical benefit or for the more liberal benefit currently offered. The rate for the benefit limited to hospitalized surgery was computed by one company upon the assumptions that the average surgical fee under the $150 maximum schedule would be $50, and that 75 per cent of hospital admissions, other than for child-birth, would involve surgical care. Since obstetrical care was considered as involving a surgical procedure, 100 per cent of admissions for child-birth would be involved. The following table sets forth the basic factors and the details of the calculation.

The assumed annual rate of hospitalization (all causes) was known to overstate the current frequency of hospitalization, thus introducing an additional margin for safety.

When the benefit was liberalized to include

	Employed Males	Employed Females		Wives		Children under 18
		Excluding Maternity Benefits	Maternity Benefits	Excluding Maternity Benefits	Maternity Benefits	
Assumed annual rate of hospitalization (all causes)	$.07	$.105	$.035	$.14	$.100	$.07
Assumed annual rate of surgical hospitalization	.053	.079	.035	.105	.100	.053
Net annual cost, at average rate of $50 per operation	2.65	3.95	1.75	5.25	5.00	2.65
Gross annual cost—loaded ⅓ of gross	3.98	$8.55		$15.38		3.98
Monthly premium (taken to nearest 5c)	.35	.70		1.30		.35

operations performed outside a hospital the rate for male employes was increased to $.40, and the rate for female employes increased proportionately. No change was made in the rates for wives and children. In practice the rate of $.40 per month per employe is charged for all employes in a group unless more than 11 per cent of the employes are females. If more than 11 per cent of the employes are females, the premium for employes is increased by the following proportions, and the same premium rate charged for all employes regardless of sex.

Per Cent of Insurance on Females	Additional Premium as Per Cent of Minimum Rate
11% to 21%	15%
21% to 31%	25%
31% to 41%	35%
41% to 51%	45%
51% to 61%	55%
61% to 71%	65%
71% to 81%	75%
81% to 91%	85%
91% to 100%	95%

Similar adjustments are made if the percentage of colored employes is abnormal.

If children are included a premium rate per family unit is used, based upon the assumption that the average family unit, averaging families with no children with families with one or more children, includes two children ("children" meaning only unmarried children between the ages of three months and eighteen years).

Thus, in this company, a policy will be issued insuring employes and their wives with a full scale of benefits at monthly rates of $.40 (or more) per employe and $1.30 per wife, or a

policy will be issued insuring employes, wives and children, at the same rate per employe, but at a rate of $2.00 per family unit, this rate applying to the family unit containing only a wife as well as to the family unit containing a wife and twelve children. The rates are reduced proportionately if the scale of benefits is reduced.

These group surgical benefits combined with hospitalization benefits have, for groups of employes and their dependents, gone a long way towards furnishing a solution to the problem of the large and unpredictable expense of medical care, and have done so without interfering in any way with the relationship between the patient and his physician. Any extension of group insurance to cover the costs of physicians' services other than for surgical procedures would be justified only if it could be offered on a basis which would permit of economical administration and upon a basis which would be generally acceptable to the medical profession. From the considerations previously set forth, it is obvious that either (1) the benefits must be restricted in their character, or (2) if the benefits are quite liberal, there must rest with the insurance company some direct control of the medical profession, or else the company must be prepared to spend a substantial percentage of its premium income to investigate and adjust claims. The one suggestion which has appealed to the author as feasible, from a purely financial point of view, is the restriction of medical care to services performed by doctors on a company selected panel. Since such a panel would necessarily be quite restricted, any such plan might well meet with opposition from the medical profession. The author is not recommending this idea, but calls attention to it since it is an essential characteristic of the community plans subsequently described. In these community plans, since all, or substantially all, of the physicians of the community may enter the plan, the same objection by the profession does not hold.

In the foregoing section of this article an attempt has been made to indicate the broader outlines of the problem and the extent to which insurance companies have sought to solve it. Under the impetus of the recent permissive legislation in a number of states various nonprofit organizations have organized or are organizing for the purpose of providing comprehensive medical services upon some basis of fixed annual cost. Both the fee-for-service basis and the annual capitation basis are used in remunerating physicians. These plans, being organized for the express purpose of insuring the cost of medical care, or providing medical care, are far less conservative in undertaking the risks involved in entering this new field than are the established insurance companies. These organizations have an important safeguard in the fact that they have contracts directly with the physicians who render the service and hence have, to some extent, both the coöperation of the physicians and control over them. The fact that these plans are more in the nature of community enterprises than in the nature of distant impersonal corporations, is doubtless an important protective factor. Despite all of these considerations, they are embarking upon hazardous and largely uncharted waters, and it would be well to watch carefully the few landmarks we know.

Once a plan of benefits has been formulated the very practical question is presented—What will these benefits cost? The answer naturally depends upon the basis and rate of compensation of the physician, and, if a fee-for-service basis, the frequency of conditions requiring insured medical service and the average number of visits per "illness." While these last two factors are not involved if the physician is paid on a capitation basis, they give the means of estimating the physician's probable income.

The interest in this subject during the past ten or fifteen years has resulted in a number of studies which have attempted to produce relevant statistics. Despite the enormous effort that has gone into these studies there appear to be very scant data upon which the actuary would rely in calculating the cost of such benefits. Fortunately there appear to be several independent approaches which furnish a means of determining reference points from which a guess may be essayed, for no calculation of the cost of insured medical benefits at the present time can be dignified as anything more than a guess. These approaches are as follows: first, an estimate may be made of the amount which individuals now pay for medical service; second, an estimate may be made of the cost of "adequate medical care" upon the basis of a given scale of fees; and third, an estimate may be made of the average charge per individual necessary to produce a given average income per physician.

Average Expenditures for Medical Care

Several studies of the average expenditures for medical care have been made within the past ten years. The most complete study is that of the Committee on the Costs of Medical Care made by Falk, Klem and Sinai, covering the experience of 8,639 white families in twelve consecutive months in the period from 1928 to 1931.[5] This study was made by means of a continuously supervised recording of the kind, frequency and duration of illness and the charges for incident medical care. The average charges for medical care were found to vary substantially by both income group and size of community. The smallness of the data when subdivided in this manner may have produced some unreliable results, but the consistency of these results is significant. The charges for services of physicians (other than oculists), excluding such charges merged in non-itemized charges of hospitals, clinics, laboratories, et cetera, as obtained from an unpublished tabulation derived from this study were as follows:

AVERAGE CHARGE PER PERSON PER ANNUM IN FAMILIES WITH SPECIFIED INCOMES

Size of Community	Under $1200	$1200 to 2000	$2000 to 3000	$3000 to 5000	$5000 to 10,000	$10,000 & over	All Incomes
Cities of 100,000 and over	7.23	7.29	9.81	14.41	20.71	44.64	13.21
Cities of 5,000 to 100,000	4.35	6.58	9.24	11.55	25.85	47.56	10.56
Towns of less than 5,000 and rural areas	4.50	6.04	8.11	10.96	16.93	28.83	7.25

The Metropolitan Life Insurance Company made a similar continuous study of medical expenses of all types (physicians' services, hospitals, nurses, medicines, etc.) for the six months period from January to July, 1929.[6] This study included 3,281 families in industrial centers. The average cost per person for all types of care during this six months period was $13.48. Very nearly half of the total recorded expenditures were for services of physicians (other than oculists), so that the above figure might fairly be taken as representative of the annual cost for physicians' services found by this survey. This compares with the over-all average of $9.43 for such services found by the Committee on the Costs of Medical Care.

A study of income of physicians, made by the Committee on the Costs of Medical Care, indicated the following average annual per capita payment during 1929 for services of physicians in private practice.[7]

Size of Community	Average Annual Expenditures for Services
Under 5,000	$ 3.31
5,000– 9,999	11.28
10,000– 24,999	9.59
25,000– 49,999	10.85
50,000– 99,999	12.43
100,000–499,999	16.25
500,000–999,999	15.89
1,000,000–and over	16.50
Total (Continental United States)	$ 8.88

A series of studies of the spending patterns of the United States population has recently been undertaken by the National Resources Committee, the United States Bureau of Labor Statistics and the Bureau of Home Economics. These studies were made by a census procedure whereby an attempt was made to obtain at one time a comprehensive record of the expenditures, for the preceding twelve months period, of the families included in the controlled samples. This procedure must sound strange to the actuary who has spent considerable time with the problems involved in the correction of errors in population statistics resulting from intentional and unintentional misstatements of such a simple bit of information as age. With respect to the reliability of the resulting data the Bureau of Labor Statistics states:

> An investigation of family income and consumption by means of schedules filled after the end of the report year is confronted with questions concerning the degree of accuracy with which families may be expected to remember details of expenditures made over a period of twelve months. It is admittedly impossible to obtain by the schedule method precise records of expenditures for each item included in family living. It is believed, however, that accuracy sufficient for the purposes of generalization can be achieved. One means toward this end followed by the Study of Consumer Purchases was the use of highly detailed schedule forms which served to remind families of the wide variety of items for which they might have incurred expenditures during the year. Such schedules, filled through painstaking interviews, provided data that in the great majority of cases undoubtedly represented closely the spending patterns of the families interviewed.

Despite the serious question as to the reliability of such a method for the purpose of indicating the exact amount expended for any specific item, there are shown below, for what they may be worth, figures derived from this study with reference to the per capita expenditures for services of physicians in New York City.[8] Considering the difference in the dates of the studies, there is a surprising correspondence between these figures and those for cities of 100,000 and over produced by the study of the Committee on the Costs of Medical Care. It is difficult to reconcile this close agreement with the indications of substantial decline in physicians' incomes during the interval between the two studies.

AVERAGE ANNUAL PER CAPITA EXPENDITURES FOR PHYSICIANS' SERVICES, 1935-1936

(Non-Relief Native White Families in New York City)

Income Level	General Practitioner	Specialist	All Physicians
$ 500–$ 999	$ 1.99	$ .15	$ 2.14
1,000– 1,499	4.51	1.24	5.75
1,500– 1,999	6.73	2.17	8.90
2,000– 2,499	8.89	2.54	11.43
2,500– 2,999	8.68	3.12	11.80
3,000– 3,499	9.12	6.95	16.07
3,500– 3,999	10.48	5.77	16.25
4,000– 4,999	13.53	4.33	17.86
5,000– 7,499	15.73	9.94	25.67
7,500– 9,999	26.75	14.71	41.46
10,000–and over	42.07	21.03	63.10

From such data as is available it appears probable that the average per capita expenditure for physicians' services is less than $10 per year, the average increasing substantially with increase in income level, and to a lesser degree with increase in size of community. While the premium for any plan of comprehensive medical service would properly be in excess of the present average expenditure it is probable that if the difference is too great, for the same economic and community group, the benefit would be very difficult to sell and the tendency towards adverse selection would be seriously increased.

Estimates of the Cost of "Adequate" Medical Care

One of the projects of the Committee on the Costs of Medical Care was an attempt to give concrete, statistical meaning to the term "adequate" medical care.[9] In this study good medical care is defined as "the kind of medicine practiced and taught by the recognized leaders of the medical profession at a given time or period of social, cultural, and professional development in a community or population group." There is no finality in this definition, it is a dynamic concept, and it will be noted that while on the one hand "good medical care" at a given time and place is something more than the average person is receiving, since it is the kind of medicine practiced by the leaders of the profession, it may be less than "good medical care" at a later time or in another place.

A standard table of sickness rates was developed by Lee and Jones from a comprehensive review of available sickness statistics. For all acute conditions, their expectancy rates describe the number of attacks to be expected during a year in an average population group. For chronic diseases, the rates describe the number of persons who are affected during a year.

Lee and Jones grouped diseases and defects in nineteen broad categories. In each category there were selected certain "typical diseases" as illustrative of service requirements. The average amount of service for typical diseases in each such category was assumed to hold for all diseases in the category. Estimates of medical service in the prevention, diagnosis, and treatment of diseases and of physical and mental defects were obtained by Lee and Jones from physicians in general practice and in special practice in several parts of the United States.

Two estimates of the cost of adequate medical care have been published, using in each case the standards of adequacy set up by Lee and Jones. The earlier study by Bradbury accepted the Lee and Jones estimates of the incidence of illness requiring medical service and computed costs based upon the schedule of minimum fees printed in the 1933-1934 "Blue Book" of the Chicago Medical Society.[10] Upon this fee schedule the cost of "adequate medical care," including x-ray and pathology but excluding mental and nervous conditions and the cost of refractions, was estimated to be $37.50 per person per annum. The later study by the Bureau of Medical Economics of the American Medical Association[11] substituted figures as to incidence of illness compiled by the United States Public Health Service,[12] and utilized an unpublished compilation by the Bureau of Medical Economics of median minimum fees based upon the fee schedules of 559 county medical societies. This calculation produced a cost

for medical care, again exclusive of mental and nervous conditions and cost of refractions, of $15.83 per person per annum. No provision was made in this latter computation for the cost of x-ray and pathology. The resulting estimated cost of medical care is comparable with an estimate for similar services of $26.33 per person per annum in the Bradbury study.

The size of the Bradbury estimate raises serious question as to the adequacy of our existing facilities to supply such service and the ability of our present economy to pay for it. In this connection attention should be called to the comments of the Committee on the Costs of Medical Care:

> If the people of the United States were receiving the medical care which they need and which the dictates of medical art and science warrant, the army of medical practitioners would have to be larger than it is at present and existing medical agencies probably could not supply services equal in quality or volume to those which the standards [of good medical care] prescribed, and the people probably would not, and could not afford to, buy them if they could be furnished."

ESTIMATES OF THE COST OF "ADEQUATE" MEDICAL CARE

(Excluding the cost of treatment of nervous and mental conditions and the cost of refractions)

Medical Care in Treatment of the Following Diseases and Conditions (Excl. of operations, laboratory and x-ray)	Average Annual Cost Per Person	
	Bureau of Medical Economics Estimate	Bradbury Estimate
Communicable diseases		
Syphilis and gonorrhea	$ .06	$ 2.10
All others	1.19	1.83
General diseases	.70	.63
Diseases of eye and ear	1.59	1.23
Diseases of circulatory system	1.19	.83
Diseases of respiratory system	2.78	6.50
Diseases of digestive system	.47	1.32
Diseases of skin and cellular tissue	.53	.27
Diseases of muscles, bones and joints	—	.26
Diseases of kidney and annexa	.49	.51
Non-venereal diseases of the G.U system	.37	.29
The puerperal state	1.26	1.32
Malformation and early infancy	.06	—
All accidents	.35	.68
All other conditions	.69	—
	$11.73	$17.77
Operations	4.10	8.56
	$15.83	$26.33
Laboratory service		5.36
X-ray service		5.81
		$37.50

The lower figure brought forth by the Bureau of Medical Economics is based upon the same standards of medical care as those used by Bradbury, and there are few substantial differences in the frequencies of illness assumed in the two studies. The results of the two studies may be brought into reasonable agreement if allowance is made for the higher incidence of venereal diseases, the greater frequency of treated diseases of the respiratory system, the higher per illness cost for treating diseases of the digestive system, and the much higher average cost per operation assumed in the Bradbury study. It should be noted that the frequency of venereal diseases included in the Bureau study is derived from data based upon voluntary statements, and hence would tend to be considerably understated. The Bureau study also made no provision for the cost of treating common colds, despite the fact that the low incidence of colds (.107 per person per annum) included in the morbidity data upon which the calculation was based would indicate that only colds of more than average severity were included in that data. A comparison of the estimates of the cost of services for the different disease categories is given in the accompanying table.

It appears from both of the foregoing studies that "adequate" medical care provided upon a fee-for-service basis at customary "minimum" fees (probably more correctly termed standard fees) would cost several times as much as the average person now pays for medical care. This large discrepancy is due to the fact that "adequate" medical care requires more service than is now rendered to the average person, and to the fact that the average collected fees for various units of service are less than the so-called "minimum" fees.

Average Income of Physicians

The evidence as to present average incomes of physicians is not very satisfactory. Studies have been made by the American Medical Association[14] and the Committee on the Costs of Medical Care[7] of the average income of physicians during the period from 1928 to 1930. These studies were based, in most instances, upon voluntary statements by physicians concerning their incomes, although in the study by the Committee on the Costs of Medical Care recourse was also had to income tax returns for 1929. As

might be expected, there is evidence in these returns of a tendency for the average income derived from the data to decrease with an increase in the percentage of questionnaires returned.

The American Medical Association study indicated incomes of physicians in private practice during 1928 as follows:

Type of Practitioner	Number in Sample	Average		Median	
		Gross	Net	Gross	Net
All practitioners.....	5,475	$10,440	$6,499	$8,090	$4,938
General practitioners	3,470	8,078	4,887	6,839	4,138
Specialists.....	2,005	14,527	8,876	11,575	7,072

The study made by the Committee on the Costs of Medical Care indicated the following incomes during 1929 for physicians in private practice.

Type of Practitioner	Number in Sample	Average		Median	
		Gross	Net	Gross	Net
All practitioners.....	6,989	$ 9,461	$5,700	$7,026	$4,100
General practitioners	3,965	6,421	3,900	5,245	2,900
Partial Specialists...	1,444	9,995	6,100	8,292	5,000
Complete Specialists.	1,580	16,304	10,000	12,239	7,500

As would naturally be supposed there was considerable variation in the indicated incomes by size of community, although the median incomes vary less than the average incomes.

No statistics are needed to know that the incomes of physicians have decreased substantially since the period of the above studies. Preliminary reports of a study by the National Bureau of Economic Research indicate that the average net incomes of physicians in private practice, including both general practioners and specialists, were in the neighborhood of $3,500 to $4,000 during the period from 1934 to 1936. It is frequently assumed that the net income represents approximately 60 per cent of the gross income, hence it may be assumed that the more recent statistics indicate an average gross income, for physicians in private practice, in the neighborhood of $6,500.

The ratio of physicians to population varies considerably from one section of the country to another. However, for practically all sections the ratio of physicians to population has shown a continuous decline during the current century. The number of physicians per 1,000 persons in the United States is given by the Committee on the Costs of Medical Care as 1.73 in 1900, 1.64 in 1910, 1.37 in 1920 and 1.26 in 1929.[18] These figures include in the number of physicians those physicians who are retired and those employed on salaries by governmental agencies, hospitals and teaching institutions. In 1929 the ratio of independent private practitioners to the population was practically one per 1,000. On the other hand, it should be noted that the population figures used above include persons in institutions and those on relief. All things considered, it would seem conservative to assume, in testing the adequacy of any rates proposed for a plan of insured benefits, a ratio in the neighborhood of one physician to 700 patients.

Several nonprofit corporations have organized, or are in the process of organization, under the provisions of the 1939 amendment of the New York insurance law permitting the formation of medical expense indemnity corporations. The New York insurance law states that "Medical expense indemnity shall consist of reimbursement for medical care provided through duly licensed physicians, for nursing service and of furnishing necessary appliances, drugs, medicines and supplies." In practice the corporations which have been organized restrict the indemnity to reimbursement for care provided by physicians. An outline of the proposed plans of two of these corporations being organized in New York City is given below. These plans are not presented as models of perfection, nor as horrible examples. It is to be hoped that a critical examination of their structure by members of this body may serve to throw light on the difficulties which may be encountered by these and similar organizations.

It should be pointed out that neither of these organizations has been quite adventurous enough to follow the pattern of the hospital service associations to the extent of proposing to offer a family coverage contract at a rate which is not in proportion, when compared with the rate for individual coverage contracts, to the increased risk involved. However, both have followed the precedent of these associations in ignoring in their premium rates the difference in incidence of volume and cost of medical service by age, sex, and marital status. In both cases an average rate is determined upon the assumption that the insured group will be no worse than a representative cross section of the population. Sales meth-

ods and underwriting procedure may well make the insured group better or worse than such a cross section.

It is obvious that a conservative estimate of the cost of medical care under an insured plan will be greater than the amount that the average person is now paying for medical care. At the same time it does not appear probable that the average person would be willing to pay the price indicated above for "adequate" medical care. It appears reasonable to assume that an insurance plan with proper safe-guards will experience a demand for service in excess of that found by the Committee on the Costs of Medical Care, i.e., an average of 2.39 physician's visits per person per year,[5] and less than that indicated by Lee and Jones as necessary for "adequate" medical care, i.e., 6.6 visits per person per year.[9]

One of the groups described below is organized as a consumers' coöperative, and while its policies are, as must necessarily be the case in any such group, the result of conference and compromise between lay people and medical people, these policies are largely the product of a lay approach. As opposed to this approach, the second plan described is sponsored by a group of physicians and its policies are largely the product of a medical approach.

In the consumers' coöperative group emphasis is placed on preventive and early therapeutic care. Medical care to be provided includes

(a) Initial and periodic physical examinations
(b) Service of general practitioner and specialists, including office, home and hospital calls, except for
  (1) pre-existing conditions
  (2) treatment of pregnancies commencing within 11 months of entrance
  (3) conditions compensable by government or under law
  (4) eye refractions
  (5) care in cases which become institutionalized
  (6) treatment of functional nervous or mental conditions
  (7) drug and alcohol addiction
(c) Laboratory and x-ray service
(d) Physiotherapy.

The general practitioner and pediatrician (who will, if desired, serve in place of the general practioner for children up to age fifteen) will be remunerated on a capitation basis, while specialists will be remunerated on a fee-for-service basis combined with a unit disbursement arrangement. Laboratory work will be handled by a commercial laboratory.

Obstetrical care is subject to an additional charge of $25, while the subscriber must pay one-third of the standard fee for x-ray service, but not in excess of $10 per year. A charge of $1 is made for the first home call by the general practitioner in treatment of each illness. Except for these extra charges, and the exclusions outlined above, the medical care to be provided is unlimited.

The premiums for this plan were computed upon the following assumptions:

(1) That the average general practitioner could handle a panel of about 1,400 patients if he handled no obstetrical or pediatric work, and should receive for such full time service, about $7,000 per year.

(2) That the average pediatrician could handle a panel of about 880 children and should receive an income for such full time service of about $8,000 per year.

(3) That the average specialist collects about 75 per cent of the standard, or prevailing fees, for the service which he renders, and that the volume of service required would be that indicated by the Lee-Jones study.

(4) That the average birth rate among insured subscribers would be 18 per 1,000 (as compared with a population birth rate of 14.26 per 1,000 in New York City during 1938), and that the cost per pregnancy is $100, of which $15 is defrayed by the additional charge. (The other $10 is assigned to cover some of the extra cost of pediatric service for children during the first year of life.)

(5) That an annual frequency of 140 x-ray procedures per 1,000 subscribers may be expected, and that the average standard fee per x-ray procedure would be $16.00, of which one-third will be paid by the patient and the balance (41.7 per cent) necessary to produce a payment of 75 per cent of standard fees, paid by the company. It should be noted that the frequency of x-ray procedures is lower than that assumed by Lee and Jones (171 per 1,000). This assumption is reminiscent of the following statement by Watson.

I have had instances repeatedly wherein a moderate reduction in the rate of sickness benefit was followed by very substantial reduction in the quantity of claims, and I have consequently become accustomed to base my estimates of the practical value of reforms upon the expectation that a reduction in the rate of benefit, in the cases in which malingering is suspected, will be accompanied by a decline in the number and duration of the claims.[38]

(6) That 1,300 laboratory procedures (exclusive of those done without cost to the company, by general practitioners, or the public health department) will be required annually per 1,000 subscribers, and that this service can be obtained from a commercial laboratory at $.27 per procedure.

These assumptions result in an estimated net annual cost as follows:

	Estimated Annual Per Capita Cost
General care (including pediatrics)	$6.00
Specialist care (other than obstetrics and x-ray diagnosis)	6.00
Obstetrics	1.53
X-ray diagnosis	1.00
Laboratory work	.35
Net Annual Premium	$14.88
Loading	3.12
Gross Annual Premium	$18.00

(Based upon estimated annual costs of $5.00 per adult and $9.10 per child, weighted 75 per cent and 25 per cent respectively.)

The uncertainty of these assumptions and the resulting estimated cost, both in the aggregate and for the various types of service, is illustrated by the fact that, after determination of the premium in the foregoing manner, provision was made to increase the annual capitation fee for general practitioners to $6.50 and for pediatricians to $10.35, reducing the provision for specialists accordingly. It will be recalled that the specialists are to be compensated under a unit disbursement plan.

Special attention is called to the fact that the uninsurable nature of early therapeutic care is recognized by the arrangement to remunerate general practitioners and pediatricians upon a capitation fee basis. The important question remains as to whether at $6.50 per year for adults and $10.35 per year per child, this plan will sufficiently compensate general practitioners and pediatricians so that physicians of proper qualifications will be attracted to the plan and be satisfied by it in operation. The evidence on both sides of this question is, to the writer's mind, inconclusive.

The proposed benefits of the second organization are in the nature of indemnification for the expense of medical service furnished by participating physicians in treatment of serious illnesses and injuries. This plan, in contrast to the one just described, does not include provision for periodic health examinations. A stipulated deductible sum with respect to each illness, varying according to the subscriber's economic status, must be paid by the subscriber to the physician before any benefits accrue. The maximum amount of indemnity which may be provided in any one year is $500, and within this maximum various amount limitations are applied to the different types of service. The rates, and limits, of indemnity are indicated by the accompanying table.

Service of	Maximum Rate of Indemnity	Limit of Indemnity During any 12 Consecutive Months
General practitioner		$300
(a) Office visit	$2.00 per visit	
(b) Home visit—daytime	3.00 per visit	
(c) Home visit—night (if service is required between 12 P.M. and 7 A.M.)	5.00 per visit	
Specialist	In accordance with schedule of fees consistent with New York State Workmen's Compensation fee schedule.	100
Surgeon		300
Surgical operation, including after care		
Pathologist		50
Radiologist		
(a) Diagnostic x-ray		100
(b) X-ray and radium therapy		300
Anesthetist		75

The exclusions under this plan are substantially the same as those in the one just described.

In determining the premium rate for this organization it was assumed,

(1) That there would be an average of 2.5 visits to general practitioners per year per person, exclusive of health examinations and obstetrical care, and that a deductible sum of $10 per illness would eliminate from the scope of the insurance one-half of the visits to the general practitioner,

(2) That the average fee per visit to general practitioners under the fee schedule adopted would be $2.50,

(3) That there would be an average of .5 visits per year per person to specialists, exclusive of

visits incident to surgical care, and exclusive of x-ray service,

(4) That the average fee per visit to specialists, after deduction of amounts paid under the deductible sum provision, would be $5,

(5) That the average annual frequency of surgical procedures would be 6.5 per 100 and the average fee per operation, in excess of any amount paid under the deductible sum provision, would be $50,

(6) That the average annual frequency of births would be 1.5 per 100 and that the average fee, in excess of amounts paid under the deductible sum provision, would be $65,

(7) That the average annual frequency of services of an anesthetist would be 5 per 100 and that the average fee would be $10,

(8) That x-ray and pathology service would cost $1.50 per year per person.

The following tabulation summarizes the calculation of the net premium.

General practitioner	
Average of 2.5 visits per year, of which one-half are excluded, @ $2.50 per visit	$ 3.13
Specialist	
Average of .5 visits per year @ $5.00 per visit	2.50
Operations	
Frequency of .065 per year @ $50 per operation	3.25
Obstetrical Care	
Frequency of .015 per year @ $65 per case	.98
Anesthetist	
Frequency of .05 @ $10 per case	.50
X-ray and pathology	1.50
Net premium	$11.86

To this net premium was added a loading of 25 per cent, producing a gross annual premium of $15.00.

The direct payment to the physician under the $10 deductible sum provision was assumed to average $6 per year per person. It will be seen that the average cost of medical care produced by this calculation is substantially in excess of present expenditures.

In an attempt to carry into this plan the traditional gradation of charges for medical care in accordance with economic status it is proposed to make provision for different premiums for persons of different income and family responsibilities. The classification adopted is shown in the accompanying table.

The premium rates for these classes were graded empirically, adopting the above rate of $15 a year for Class A, $12.60 for Class B, $10.80 for Class C and $9.00 for Class D. The deductible sum was also graded from $10 for Classes A and B to $7.50 for Class C and $5.00 for Class D. The payments to physicians will be on a unit disbursement plan, the funds for each class being kept separate for this purpose. It is estimated that if the foregoing assumptions as to average amount of medical care are realized these premiums will permit payment of 100 per cent of the standard schedule fees for services to the Class A subscribers, 80 per cent of such fees for services to the Class B subscribers, 60 per cent for services to the Class C subscribers and 40 per cent for services to the Class D subscribers. Obviously different assumptions as to the average amount of medical care would change these ratios.

ECONOMIC STATUS—INCOME PER MONTH

Class	Married Persons and Members of Their Families	Single Persons
A	over $175	over $125
B	$140–$175	$100–$125
C	$100–$140	$ 75–$100
D	under $100	under $ 75

If the selection of subscribers is such as to produce a representative cross section of the population, and if the medical service required by the subscribers is such as to permit an average of 700 subscribers per full time physician, then these rates are apparently sufficient to provide an average gross annual income per physician in the neighborhood of $8,000, or an average net income in the neighborhood of $5,000.

The difficulty of determining the economic status of the individual, for purposes of correct determination of his class, and of making adjustments as an individual's status changes, are obvious. Some of these difficulties are minimized when the enrollment is conducted on a group basis. The claims administration procedure may also be utilized to pick up some of the unavoidable misstatements and changes in status. Only experience will tell whether the substantial difficulties which remain can be controlled by other means.

As previously stated, sound sales and underwriting procedures are vital to the success of these organizations. Both of the above organizations contemplate enrollment of subscribers under substantially group underwriting rules, with payroll deduction or its equivalent, although the

contracts to be issued will be individual contracts. However, both organizations contemplate enrollment of individual subscribers, at somewhat higher premiums, subject to satisfactory medical examination. Under the group enrollment procedure an employe might apply for coverage for himself, his wife and children, the same rate being charged for each individual covered.

While it is the writer's desire to make this article completely objective, he feels that the following generalizations with reference to the insurance of the expense of medical service are warranted:

1. Not all types of physicians' services meet the requirement, for an insurable hazard, that the happening of the event must not be subject to the control of the insured individual. The services which most nearly meet this criterion are surgical procedures and treatment of injuries received in accidents. The services which fail most completely to meet this criterion are health examinations, obstetrical care, the first few visits of a physician in treatment of an illness, and x-ray service.

2. If the physician is remunerated on a capitation fee basis, the financial effect upon the "insurer" of the non-insurable nature of early visits by physicians is eliminated. In this situation, however, the individual physician must bear the risk of providing an unpredictable amount of benefit for a fixed annual price, and hence becomes the real insurer of these services.

3. While not an insurable hazard, periodic health examinations may, in view of their predictable nature, constitute a type of service which can be incorporated in a plan of insurance without endangering the financial stability of the insurer, if proper provision is made for the cost of such examinations.

4. Obstetrical care can be safely included in a plan of insurance only if the method of enrollment of subscribers is such as to avoid, or minimize, self-selection for the purpose of taking advantage of such benefits. If such self-selection is substantially avoided, obstetrical care, although not an insurable hazard, also constitutes a type of service which can appropriately be added to a plan of insurance of medical expense.

5. Any plan which attempts to furnish comprehensive medical service must offer benefits which are, to a greater or lesser degree, not insurable risks, and hence, to prevent undue abuse of the plan, must rely upon some method of supervision of the physicians providing the service and upon the right of cancellation of individual subscribers' contracts.

6. There is an almost complete lack of statistics satisfactory for the precise determination of the cost of insured medical services. It seems highly probable that under any insured plan the rate of demand for services will be increased, and hence, ignoring administrative expenses, either the average cost of service to the public must be greater than at present or the rate of remuneration to physicians per unit of service must be less. It also seems reasonable to assume that the average cost should be less than that indicated by the existing estimates of the cost of "adequate" medical care, unless there is a substantial increase in the ratio of physicians to population.

7. A sound basis of selection of lives to be insured is fundamental to the success of any plan undertaking to insure the expense of medical services. Employed individuals enrolled on a group basis, with minimum participation requirements, are undoubtedly the best risks. The enrollment of dependents of employed individuals with similar participation requirements, and the enrollment of individuals with conservative medical examination requirements, may furnish a sound basis of selection.

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REGISTRATION FEES

At a recent meeting of the Minnesota State Board of Medical Examiners Dr. Max W. Alberts presented a request from Medical Reserve officers, who had been called into active service, that they be exempt from paying the annual registration fee while on duty. The board would have liked to accommodate these men, but it realized that it had no power to waive the fee since it is stipulated by law. Should the law be changed, the board would be compelled to curtail its legal activity in prosecuting quacks because the present income is scarcely enough to conduct its present active program. The board hoped that the local county medical societies would find a way to assume the registration fees for its members who are away in Army service.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

J. F. Du Bois, M.D., Secretary

PHYSICIANS LICENSED FEBRUARY 14, 1941

January Examination

Ambrusko, John—U. of Buffalo, M.D. 1937, Mayo Clinic, Rochester, Minn.

Arnow, Leslie Earle—U. of Minn., M.B. 1940; M.D. 1940, 226 Medical Sciences, University of Minnesota, Minneapolis.

Beare, John Byron—St. Louis U., M.D. 1939, Mayo Clinic, Rochester, Minn.

Bennett, Warren Alfred—Northwestern, M.B. 1937; M.D. 1938, Mayo Clinic, Rochester, Minn.

Boosalis, Nicholas Gus—U. of Minn., M.B. 1940, St. Mary's Hospital, Duluth, Minn.

Bryson, John Chalmers—Johns Hopkins, M.D. 1938, Mayo Clinic, Rochester, Minn.

Buck, Ronald M.—Northwestern, M.B. 1938; M.D. 1939, Mayo Clinic, Rochester, Minn.

Burdon, Phyllis J.—U. of Ore., M.D. 1939, Mayo Clinic, Rochester, Minn.

Cain, James Clarence—U. of Texas, M.D. 1937, Mayo Clinic, Rochester, Minn.

Carlson, Russel Edward—U. of Minn., M.B. 1939; M.D. 1940, Eitel Hospital, Minneapolis, Minn.

Conant, Robert Falk—U. of Minn., M.B. 1940, Ancker Hospital, Saint Paul, Minn.

Dobyns, Brown McIlvaine—Johns Hopkins, M.D. 1939, Mayo Clinic, Rochester, Minn.

Dunlap, David Logan—Harvard, M.D. 1939; Mayo Clinic, Rochester, Minn.

Finlayson, Alister Ian—U. of Neb., M.D. 1937, Mayo Clinic, Rochester, Minn.

Flora, LeRoy William—U. of Minn., M.B. 1939; M.D. 1940, 2545 Grand Ave., Minneapolis, Minn.

Gast, Charlotte Marie—U. of Rochester, M.D. 1934, Medical School, University of Minnesota, Minneapolis.

Harvey, George, Jr.—Vanderbilt, M.D. 1938, Mayo Clinic, Rochester, Minn.

Hopkins, Edward Orson—Johns Hopkins, M.D. 1937, Mayo Clinic, Rochester, Minn.

Hurwitz, Milton Mayer—U. of Minn., M.B. 1939; M.D. 1940, Minneapolis General Hospital, Minneapolis, Minn.

Jacobson, Clifford Wilton—U. of Minn., M.B. 1940, Ancker Hospital, Saint Paul, Minn.

Janes, Joseph Mowat—U. of Western Ont., M.D. 1936, Mayo Clinic, Rochester, Minn.

Jensen, Nathan Kenneth—Wash. U., Mo. M.D. 1935, University Hospital, Minneapolis, Minn.

Keeley, James Kenneth—Harvard U., M.D. 1937, Mayo Clinic, Rochester, Minn.

Kiernan, Paul Chapman—Geo. Wash. U., M.D. 1937, Mayo Clinic, Rochester, Minn.

Kreilkamp, Bernard Leo—U. of Minn., M.B. 1940, Minneapolis General Hospital, Minneapolis, Minn.

Kruzich, Stephen John—Rush Med. Col., M.D. 1940, St. Joseph's Hospital, Saint Paul, Minn.

Laikola, Leslie Alexander—U. of Minn., M.B. 1940, 627 N. Court Street, Eveleth, Minn.

Lillie, John Canfield—U. of Mich., M.D. 1939, Mayo Clinic, Rochester, Minn.

Lyon, John Dexter, Jr.—U. of Minn., M.B. 1939; M.D. 1940, 151st F. A., Camp Claibourne, La.

Manchester, Raymond Day—U. of Minn., M.B. 1940, Northwestern Hosp., Minneapolis, Minn.

Moreton, Robert Dulaney—U. of Tenn., M.D. 1938, Mayo Clinic, Rochester, Minn.

Mork, Arthur Harold—Creighton U., M.D. 1940, Ancker Hospital, Saint Paul, Minn.

Morrison, Andrew Ervine—U. of Minn., M.B. 1939; M.D. 1940, Minneapolis General Hospital, Minneapolis, Minn.

Musty, Nicholas J.—U. of Minn., M.B. 1940, 2057 Laurel Ave., Saint Paul, Minn.

Nelson, Lloyd Stanley—U. of Minn., M.B. 1940, Ancker Hospital, Saint Paul, Minn.

Otten, Fred Ross—La. State U., M.D. 1940, Ancker Hospital, Saint Paul, Minn.

Owens, William Alexander—U. of Minn., M.B. 1937; M.D. 1938, Montevideo, Minn.

Patterson, Stuart Alexander—U. of Minn., M.B. 1940, St. Mary's Hospital, Duluth, Minn.

Proudfit, Charles Hinkley—Indiana U., M.D. 1934, Mayo Clinic, Rochester, Minn.

Reif, Henry Joseph—U. of Minn., M.B. 1939; M.D. 1940, Ancker Hospital, Saint Paul, Minn.

Rinkey, Eugene—U. of Minn., M.B. 1940, St. Mary's Hospital, Minneapolis, Minn.

Rooke, Edward Douglas—Queens U., M.D. 1937, Mayo Clinic, Rochester, Minn.

Ross, John Morse—U. of Oregon, M.D. 1940, Ancker Hospital, Saint Paul, Minn.

Sidell, Chester Marquis—Rush Med. Col., M.D. 1938, Mayo Clinic, Rochester, Minn.

Thornell, William Clyde—U. of Cincinnati, M.D. 1940, Mayo Clinic, Rochester, Minn.

Thorson, Stephen Benedict—U. of Manitoba, M.D. 1936, Mayo Clinic, Rochester, Minn.

Ward, Byron H.—U. of Oregon, M.D. 1939, Mayo Clinic, Rochester, Minn.

Whitehouse, Francis Record—U. of Virginia, M.D. 1938, Mayo Clinic, Rochester, Minn.

By Reciprocity

Sorenson, Philip Woodrow—U. of Iowa, M.D. 1939, Northwestern Hospital, Minneapolis, Minn.

Tanner, Frank Harold—U. of Neb., M.D. 1938, Mayo Clinic, Rochester, Minn.

National Board Credentials

Call, John Daniel—U. of Virginia, M.D. 1938, Mayo Clinic, Rochester, Minn.

Hoagland, Paul Ingalls, Jr.—Stanford U., M.D. 1938, Mayo Clinic, Rochester, Minn.

Minneapolis Man Pleads Guilty to Performing Abortion on Wife

Re: State of Minnesota vs. Melchior Erick Arvidson.

On March 15, 1941, Judge W. W. Bardwell of the District Court of Hennepin County, sentenced Melchior Erick Arvidson, thirty-seven years of age, to a term of not to exceed four years in the State Reformatory at St. Cloud, and then stayed the execution of the sentence, placing the defendant on probation for a period of two years. Arvidson was arrested by Minneapolis police officers on January 26, 1941, in his home at 5621 31st Avenue South, Minneapolis. According to Arvidson's statement to the Police Department, he is a WPA worker and the father of three children ranging in age from nine months to six years. His wife was again pregnant and had told her husband that unless she was able to terminate her present pregnancy, she would commit suicide. The husband stated that his wife purchased a catheter which he attempted to insert into the uterus. He then forced air into the catheter with Mrs. Arvidson dying almost immediately. The cause of death was given as an air embolism from attempted induced abortion. Arvidson was indicted by the grand jury of Hennepin County on February 4, 1941, charged with the crime of abortion. On being arraigned in Court, he entered a plea of not guilty and bail was fixed at $3,000.00. However, on February 10, 1941, Arvidson withdrew his plea of not guilty and entered a plea of guilty, the matter being referred to the Probation Officer of Hennepin County for an investigation.

Arvidson holds no license to practice any form of healing in the State of Minnesota, and neither has he any education in any of the healing arts. There was no evidence to indicate that Arvidson had been engaged in any other similar illegal activities, although he did state that his wife had previously aborted herself on several occasions with elm bark.

Minnesota Supreme Court Upholds Conviction of Minneapolis Physician for First Degree Manslaughter

Re: State of Minnesota vs. R. J. C. Brown, M.B.

On March 7, 1941, the Supreme Court of Minnesota affirmed the conviction of Richard J. C. Brown, M.B., Negro physician of Minneapolis, who was convicted of manslaughter in the first degree on November 22, 1939, by a Hennepin County District Court jury. Brown has been taken to the State Prison at Stillwater to commence his sentence of not less than five and not more than twenty years at hard labor.

Brown was arrested on August 16, 1939, by the Minneapolis Police Department following a complaint being signed against him by the father of a twenty-two-year-old girl upon whom it was claimed that Brown had performed a criminal abortion. The complaint alleged that the abortion was performed on July 31, 1939, the girl dying on August 23, 1939, at the Minneapolis General Hospital. At the trial, Brown did not take the witness stand in his own behalf.

According to the records of the Minnesota State Board of Medical Examiners, Brown was born at Lincoln, Nebraska, January 17, 1893, and graduated from the University of Minnesota on June 17, 1920. He was licensed to practice medicine in Minnesota the same year. The records at the University of Minnesota disclose that Brown never completed his internship and the degree of Doctor of Medicine was never conferred upon him. Brown's license to practice medicine in Minnesota was revoked by the Minnesota State Board of Medical Examiners on February 9, 1940, following his conviction.

MISCELLANEOUS

Chest X-ray Methods

Experimenters have worked to devise a means of making chest x-rays of groups of people, economically and at a rapid rate. Last year approximately 490,000 students received special service which, in most cases, included an x-ray examination. Industrial groups are demanding a similar service. Mobilization for military training has further focused attention on mass methods of x-ray examination. S. Reid Warren, Jr., of the Moore School X-ray Laboratory here presents brief comments of six methods now in use. Estimates of costs and weights are averages from which particular data may differ. The choice of methods depends, of course, on the particular task to be done.

Stereoscopic 14 by 17 inch Films

This is the best single method of chest x-ray examination. It requires expensive ($4,000-$5,000), bulky (1,000 pounds) equipment which must be permanently installed in conjunction with an adequate system to supply electric power to it (230 volts, 35-150 amperes alternating current). Exposure times from 1/30 second to 1/10 second are generally used. A specially equipped darkroom is required to process the films. Two films (unexposed film—$1.50) are required for each examination. It is difficult to make exposures, process the films, and examine them fast enough to use this excellent method for mass surveys. The excellence of this method is the result of (1) high contrast within the diagnostic area of each roentgenogram, (2) small unsharpness or blurring of shadow borders, (3) convenient size for direct viewing, and (4) stereoscopic perception (Fig. 1).

Single 14 by 17 inch Films

The same kind of x-ray generating apparatus is used for producing stereoscopic and single chest roentgenograms. The auxiliary equipment for making single films is less complicated and bulky. Apparatus has been constructed which can be carried in a truck and assembled to examine groups. One film (unexposed—$0.75) is required for each examination. Advantages of this method are (1) high contrast, (2) small unsharpness of shadow borders, and (3) convenient size for viewing (Fig. 1).

Rolls of Paper 14 by 17 inch

Rolls of paper 14 inches wide and about 150 feet long coated on one side with a photographic emulsion are used for this method which was devised specifically for surveys. A roll of paper is mounted within a light-tight mechanism which is arranged so that, after the first roentgenogram is made near one end, the paper can be moved about 18 inches in preparation for the second exposure. After 100 exposures are made, the roll is removed and processed in special equipment. The roentgenograms are viewed by reflected light in a viewing device in which the roll of paper can be mounted. The x-ray apparatus and technic for paper are practically equivalent to those used for 14 by 17 inch film, though slightly more exposure is required for paper. The contrast in paper is less than in film although the diagnostic value appears not to be seriously com-

promised by this deficiency. Apparatus is transportable in a truck, rate of exposure is high (100 per hour), and examination of the roentgenogram is quick and convenient. The company which has developed this method supplies all apparatus, and delivers completed roentgenograms to the physician for $0.75 to $1.00 per patient (Fig. 2).

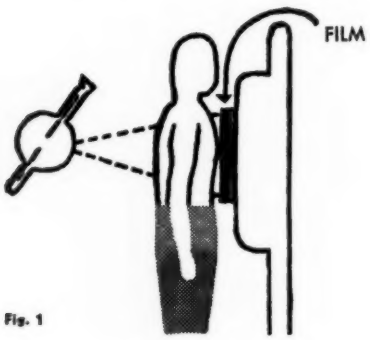


Fig. 1

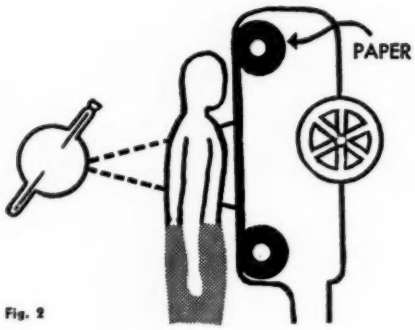


Fig. 2

Photofluorograms

In these methods, *x-rays* pass from the tube through the patient to a (14 by 17 inch) fluorescent screen which is thus caused to emit *light*. A photographic camera is focused upon the fluorescent screen in order to record the pattern of areas of varying brightness of *light* produced on the screen by *x-rays*. The screen, lens, and photographic film must be as fast as possible in order not to require excessive x-ray exposure. High-voltage generating equipment like that used for 14 by 17 inch film is required for photofluorography. Using screen and cameras now available, the unsharpness or blurring of shadow borders is greater in photofluorograms than in 14 by 17 inch roentgenograms.

The lens used to make 4 by 5 inch photofluorograms is expensive ($1,000). The 4 by 5 inch film is large enough to view without magnification. These films can be processed more conveniently than 14 by 17 inch film; the cost (one processed film, $0.06) and filing space are far less for the smaller (4" x 5") film. Four inch film in rolls is not available.

The lens generally used to make 35 mm. photofluorograms is an f:1.5 lens of the type used in miniature cameras. The 35 mm. photofluorogram must be enlarged for clear viewing. Rolls of film can be exposed and processed by means of easily available photographic equipment; the cost (for each processed film, $0.02) of film for each exposure is of course very small.

These methods are being studied in order to find means of overcoming the low contrast and gross unsharpness which are their chief disadvantages (Fig. 3).

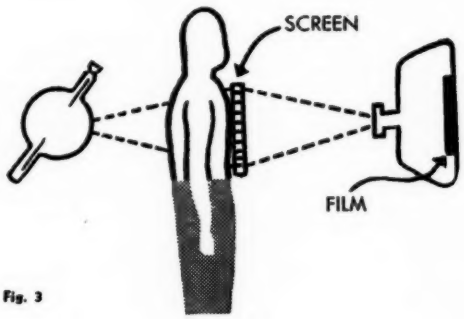


Fig. 3

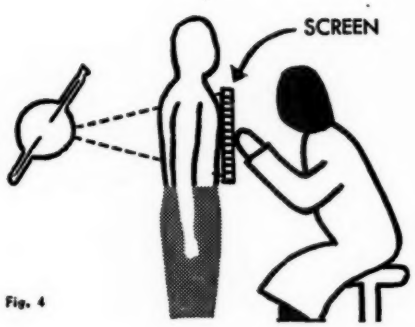


Fig. 4

Fluoroscopy

Apparatus for fluoroscopy is relatively inexpensive ($800) and it requires a relatively low power input (10 volts, 10 amperes alternating current). The physician examines the fluorescent image of the chest in a darkened room and records his opinion. Thus there is no permanent record which can be reëxamined by others. The contrast and sharpness of the fluoroscopic image are greatly inferior to those of a good 14 inch by 17 inch roentgenogram. The physician is subjected to scattered x-rays during the examination. This may be dangerous in a mass survey (Fig. 4).

No x-ray survey method is an adequate substitute for a complete x-ray examination of the chest. The purpose of a survey is to segregate as accurately as possible those subjects whose chests are normal and those subjects who should be referred to a roentgenologist for a complete examination because of suspicious shadows seen by the physician who conducts the survey.—Tuberculosis Abstracts, April, 1941.

OF GENERAL INTEREST

A daughter, Harriet, was born to Dr. and Mrs. Alexander Blumstein of Minneapolis, January 13.

* * *

Dr. and Mrs. John A. Haugen of Minneapolis are the parents of a daughter, Martha Caroline, born February 14.

* * *

Dr. F. A. Willius and T. E. Keys of Rochester are the authors of a book, "Cardiac Classics," which has just been released by the publishers.

* * *

Dr. Theodore F. Hammermeister of New Ulm has fully recovered after an illness of several months, and has resumed his practice in medicine and surgery.

* * *

Dr. and Mrs. George F. Engstrom of Belgrade returned in March after a two-months' vacation in California.

* * *

Dr. Percy C. Johnson, who has been assistant physician at the Tyler Clinic in Tyler, has entered into partnership with Dr. A. L. Vadheim in the clinic.

* * *

Dr. and Mrs. Elmer M. Rusten of Minneapolis will leave April 8 for a month's hunting expedition for Kodiak Bear on the Alaskan Island of the same name.

* * *

The marriage of Miss Carolyn E. George and Dr. Carleton W. Leverenz of Saint Paul took place March 22 in the Fort Snelling chapel.

* * *

Dr. Edgar B. Brown, associate professor emeritus in pharmacology, University of Minnesota Medical School, is making his home in Paynesville, Minnesota. He still maintains his interest in raising flowers.

* * *

Dr. G. J. Thompson of Rochester addressed a meeting of the Southeastern Surgical Congress in Richmond, Virginia, March 10. His subject was "Carcinoma of the Prostate."

* * *

Dr. William F. Braasch of Rochester presented a paper, entitled "Hypertension and the Surgical Kidney," at a meeting of the Cuban Urological Society in Havana, Cuba, March 5.

* * *

Dr. E. V. Allen of Rochester addressed a Founders' Day banquet of the University of Kansas School of Medicine in Kansas City, March 14. He presented a paper, "Diseases of the Peripheral Blood Vessels."

* * *

Dr. James B. Carey of Minneapolis has taken on editing duties in addition to his medical practice. He is editor of the *Nicollet Clinic Bulletin,* a quarterly publication. The first issue of the second volume is scheduled to appear this month.

* * *

Dr. Edward C. Maeder of Minneapolis will give the final lecture in a marriage forum being held by the Minneapolis Seton Guild. He will talk on "Biology of Marriage," at the Seton Guild, April 7.

* * *

Dr. Ernest S. Mariette presented a review of twenty-five years of service of the Glen Lake Sanatorium in a recent issue of the *Bulletin of the Hennepin County Medical Society.*

* * *

Dr. Waltman Walters of Rochester delivered the seventeenth Lewis Linn McArthur Lecture of the Frank Billings Foundation of the Institute of Medicine in Chicago, March 28. His subject was "Pathologic Physiology of the Common Bile Duct."

* * *

Officers of the Minnesota State Board of Health were reëlected at a recent meeting. Dr. E. S. Platou of Minneapolis is president; Dr. T. B. Magath of Rochester, vice president; and Dr. A. J. Chesley, secretary and executive officer.

* * *

Dr. Ralph V. Platou, who is completing work for his Ph.D. in pediatrics at the University of Minnesota Medical School, is to become associated in practice with his brother, Dr. Erling S. Platou, 953 Medical Arts Building, Minneapolis.

* * *

Dr. John O'Hanlon of Norwood has taken over the practice of Dr. Arthur Neumaier of Lindstrom, who has been called to active duty with the United States Army. Dr. Neumaier has been assigned to Carlisle Barracks in Pennsylvania.

* * *

Dr. Leo G. Rigler and Dr. John R. Paine of the University of Minnesota Medical School will go to Chicago, April 10, to present a paper, "Clinical and Roentgenological Manifestations of Acute Abdominal Disorders," before the Chicago Roentgen Ray Society.

* * *

The annual Russell D. Carman lecture, presented under the auspices of the St. Louis (Missouri) Medical Society, was given March 25 by Dr. Byrl R. Kirklin of Rochester. His subject was "Cancer of the Gastro-intestinal Tract: Its Early Manifestations."

* * *

Dr. Irvine McQuarrie, head of the department of pediatrics at the University of Minnesota Medical School, was in Chicago, March 27, to attend a meeting of the Council on Foods and Nutrition of the American Medical Association, of which he is a member.

* * *

En route to Muncie, Indiana, where he was to begin his duties as a staff physician at Muncie Clinic, Dr. J. J. Westra of Owatonna was injured in an automobile accident, March 13. He suffered a fractured leg and jaw, and was taken to a Charles City, Iowa, hospital for treatment.

Dr. E. J. Schmitz, a graduate of the University of Minnesota Medical School, has taken over the surgery practice of Dr. M. C. Kern at Freeport. Dr. Kern is with the 217th coast artillery, United States Army, in California. Dr. Schmitz recently completed his internship at the Northwestern Hospital in Minneapolis.

* * *

Dr. J. A. Williams of Minneapolis has opened offices in Hibbing for the general practice of medicine and surgery. He is a graduate of the University of Minnesota Medical School, and served internships at the Swedish Hospital in Minneapolis and at St. Mary's Hospital in Duluth. * * *

Naval Reserve officers in Minnesota who have been recommended and approved for promotion to the grade of commander in the volunteer reserve of the medical corps include: Dr. Donald McCarthy, Minneapolis, general service; and Dr. A. M. Snell of Rochester, special service. * * *

Construction has been started on a new medical center in Saint Paul to be erected at a cost of between $40,000 and $50,000. Located at East Seventh Street and Mounds Park Boulevard, the center is being built for Dr. E. C. Emerson and associates. There will be quarters for ten doctors and a dentist.

* * *

It may not be generally known that material for preparing addresses to the laity on medical subjects, is available to members of the profession at the Bureau of Health Education of the American Medical Association. Material in the form of clippings is loaned to those so requesting for ten-day periods, at no cost except return postage.

* * *

Guest faculty members for the course in obstetrics at the University of Minnesota Center for Continuation Study, April 3 to 5, included: Dr. James E. Fitzgerald, assistant professor of obstetrics at the Northwestern University Medical School; and Dr. Buford G. Hamilton, assistant professor of obstetrics and gynecology at Kansas University, Kansas City, Missouri.

* * *

Dr. William A. Owens has become associated with Dr. L. R. Lima in Montevideo. A graduate of the University of Minnesota Medical School, Dr. Owens interned at the Kansas City hospital. He was on the staff of the General Santa Fe Hospital at Topeka, Kansas, before going to Montevideo. His wife is the former Hildegarde Lima.

* * *

Dr. Philip S. Hench and Mrs. Hench of Rochester left last month for the South. Dr. Hench is spending a week in Havana where he is continuing his investigation on the history of the conquest of yellow fever. On his return he will conduct a clinic on "Gout" at the American College of Physicians in Boston, and will participate in a symposium on "Chronic Arthritis." * * *

Dr. William A. O'Brien, director of postgraduate medical education at the University of Minnesota Medical School, was in Rockford, Illinois, March 25 to speak at Rockford College and before the Rockford Women's Club.

On March 26, Dr. O'Brien participated in the vocational conference at Carleton College in Northfield. He talked on "Opportunities in Medicine."

* * *

Dr. James S. McCartney, Jr., associate professor of pathology at the University of Minnesota Medical School, presented several papers at a postgraduate course in Winnipeg, March 6 and 7. The course was sponsored by the University of Manitoba Medical School and the Winnipeg Medical Society.

On February 11, Dr. McCartney addressed a meeting of the Cerro Gordo Medical Society in Mason City, Iowa. * * *

Dr. Owen H. Wangensteen of Minneapolis, head of the surgery department at the University of Minnesota Medical School, delivered three lectures at the University of Oregon Medical School in Portland, February 13-15. His subjects were: "Studies on the Etiology of Appendicitis," "Practical Aspects of the Therapeutic Problem in Bowel Obstruction" and "The Ulcer Problem Viewed from the Standpoint of Etiology and Therapy." * * *

Speakers at the first annual meeting of the Central Surgical Association held at the University of Michigan Medical School in Ann Arbor, February 28 and March 1, included Dr. J. Grafton Love of Rochester whose subject was "Glossopharyngeal Neuralgia: Diagnosis and Surgical Treatment." Drs. J. M. Waugh and H. B. Macey, also of Rochester, presented papers, entitled "Carcinoid Treatment of the Cecum" and "Surgical Treatment of Axillary Hidrosadenitis Suppurative."

* * *

The serum laboratory in the department of pediatrics at the University of Minnesota has been enlarged, in order to accommodate a new machine which has been developed for desiccating human plasma, making serum available for use as a blood substitute in the treatment of shock and hypoproteinemia. It is possible that the laboratory may be designated by the United States Surgeon General as one of several centers to furnish such plasma serum in war.

* * *

Dr. Karl Wilhelm Stenstrom, professor of biophysics, University of Minnesota Hospitals, spoke to members of the Women's Field Army for the Control of Cancer, March 12, following a conducted tour of the radiation department of the Cancer Institute, of which he is a director. The tour and talk were followed by a dinner at the Center for Continuation Study, at which reports on the recent regional conference in Rochester were presented. In the evening, members attended the meeting of the American College of Surgeons in Northrop Auditorium, at which Dr. George T. Pack of New York City discussed "Cancer is Curable."

* * *

Dr. Harold S. Diehl, dean of medical sciences at the University of Minnesota, was in Washington, D. C., April 1, to participate in a conference concerned with deferring medical students from military service. He is a member of the Sub-Committee on Medical Education of the Committee on Health and Medicine, National Council on Defense, which met with officers from the selec-

tive service headquarters. The meeting was a continuation of a conference held in March, which Dr. Diehl also attended.

* * *

The John Scott Medal, given by the city of Philadelphia for outstanding achievement in medical science, has been awarded to Dr. Owen H. Wangensteen, head of the department of surgery at the University of Minnesota.

The award, which also includes a cash gift for $1,000, was made for Dr. Wangensteen's development of a suction syphonage treatment of acute intestinal obstruction. For this work, he also was awarded the Samuel Gross medal by the Philadelphia Academy of Surgery in 1934 when the treatment was still experimental.

* * *

Dr. W. A. Fansler of Minneapolis will be among the guest speakers at the annual meeting of the North Dakota State Medical Association in May in Grand Forks. He will speak May 20 on "Diagnosis and Treatment of Carcinoma of the Bowel." The next day he will lead a round-table luncheon discussion on "Office Treatment of Anorectal Diseases."

Dr. Henry E. Michelson of Minneapolis will also participate in the program. He will talk on diseases of the skin, and will also lead a round-table discussion.

* * *

Dr. Willis H. Thompson of Tennessee has returned to Minneapolis to take over the practice of Dr. Chester A. Stewart who has accepted a position as head of the department of pediatrics at Louisiana State University in New Orleans, Louisiana. Dr. Stewart, who has been clinical professor of pediatrics at the University of Minnesota and director of the University's out-patient department in pediatrics, will leave this summer for New Orleans.

Dr. Thompson, who taught in the University of Minnesota pediatrics department ten years, has for the past two years conducted in forty-five Tennessee cities a postgraduate course in pediatrics, sponsored by the Tennessee State Medical Association.

* * *

Dr. A. V. Stoesser, associate professor of pediatrics at the University of Minnesota Medical School, and Miss Gertrude Carlsrud, nursing instructor in premature infant care, Minnesota State Department of Health, were among the speakers at the Conference of State Directors and Maternal and Child Health Service in Washington D. C., March 24, 25, and 26. Dr. Stoesser's subject was "How to Set Up a State Program for Reducing Infant Mortality." His work at the Minneapolis General Hospital, is being used as a foundation for state programs.

Representing the Minnesota State Department of Health at the conference were Dr. Viktor O. Wilson, director of the Division of Child Hygiene, and Dr. E. C. Hartley, consultant.

* * *

With Dr. J. J. Westra's moving from Owatonna to Muncie, Indiana, several changes in location have been made by physicians in southeastern Minnesota.

Dr. S. D. Whetstone of Winona has gone to Owatonna to take over the practice of Dr. Westra, and Dr. W. M. Meyer, Rollingstone, has taken over Dr. Whetstone's practice in Winona. Dr. Meyer for the present will maintain evening office hours in Rollingstone where he has been located since August. He has moved his family to Winona.

Dr. Whetstone, who has been practicing in Winona for three and a half years, moved his family to Owatonna the latter part of February.

* * *

Medical reserve officers, who had been ordered to active duty and whose orders have been revoked, include:

Dr. Arthur F. Dworak, captain, Saint Paul, who had been ordered to Fort Bliss, Texas.

Dr. David Albert Burlingame, first lieutenant, Minneapolis, who had been ordered to William Beaumont General Hospital, El Paso, Texas.

Dr. Henry B. Grimes, major, Madelia, who had been ordered to Fort Ord, Presidio of Monterey, California.

Dr. Abraham B. Rosenfield, captain, Hibbing, who had been ordered to Army and Navy General Hospital, Hot Springs, Arkansas.

Dr. Joseph Herman Sagi, first lieutenant, Minneapolis, who had been ordered to Fort Lewis, Washington.

Dr. Raymond Paul Hawkinson, captain, Robbinsdale, who had been ordered to Fort Des Moines, Iowa.

* * *

That the average ability of students admitted to the University of Minnesota Medical School seems to be definitely increasing, was reported by Dr. Harold S. Diehl, dean of medical sciences, in his report to the President of the University for the period 1938-40.

Although several hundred applications for admission to the Medical School are received each year, facilities necessitate the limitation of students accepted to about one hundred. Applicants who are native residents of Minnesota are given preference, with second preference given to applicants from north central states which have no medical schools of their own. Applicants from other sections of the country are accepted only if there are special reasons for so doing, the most common reason being that they are outstanding students and sons and daughters of alumni of the University of Minnesota.

Under new requirements, which became effective in the fall of 1939, requirements for admission include a minimum of three years of college work and courses in physical chemistry, psychology, genetics and eugenics, in addition to the science work previously required.

* * *

Participating in the scientific programs at the fifth annual meeting of the New Orleans Graduate Medical Assembly in New Orleans, March 3-6, were several Minnesota men.

Dr. Paul A. O'Leary of Rochester presented a paper on "The Eczemas," "The Newer Methods of Treatment of Syphilis" and "Nonspecific Therapy of Cutaneous Disease."

Dr. Leo G. Rigler, professor of radiology at the University of Minnesota Medical School, presented two papers, one entitled "Benign and Malignant Tumors of the Stomach," and the other, "Roentgenological Findings in Acute Abdominal Conditions." He also participated in a symposium on hyperthyroids.

Dr. John R. Paine, assistant professor in surgery at the University of Minnesota, also took part in the program, speaking in place of Dr. Owen H. Wangensteen, head of the surgery department, who could not attend. Dr. Paine presented papers on the following subjects: "Postoperative Strictures of the Common Duct," "Diagnosis of Acute Abdominal Disorders," and "Oxygen Poisoning." He also presented the latter paper before students of Tulane University Medical School. "Intestinal Obstructions" was the title of his talk given at a joint meeting with the Orleans Parish Medical Society, March 7.

* * *

Physicians who will deliver lectures this spring in the Minnesota State Medical Association College Lecture Course are: Dr. F. J. Hirschboeck, Duluth, "On Choosing a Doctor," State Teachers College at Moorhead, April 16; Dr. R. M. Burns, Saint Paul, "What Every Student Should Know About First-Aid," State Teachers College at Bemidji, April 18; Dr. J. R. Meade, Saint Paul, "Eating Wisely and Well," State Teachers College at Bemidji, May 23.

Lectures have already been delivered at St. Scholastica, Duluth; Hamline University; State Teachers College at Winona; Concordia College at Moorhead; State Teachers College at St. Cloud; College of St. Teresa at Winona; St. Mary's College at Winona; Carleton College at Northfield; Luther Theological Seminary at Saint Paul; Gustavus Adolphus at St. Peter; Augsburg College at Minneapolis; State Teachers College at Moorhead; and College of St. Benedict at St. Joseph.

Physicians who lectured were: Drs. D. W. Wheeler of Duluth, A. C. Hilding of Duluth, Harold N. Wright of the University of Minnesota Medical School, E. L. Tuohy of Duluth; F. L. Bryant of Minneapolis; W. A. O'Brien of the University of Minnesota Medical School, J. S. Lundy of Rochester, L. R. Boies of Minneapolis, A. V. Stoesser of the University of Minnesota Medical School, J. R. Meade of Saint Paul, M. J. Nydahl of Saint Paul, and A. E. Hansen of the University of Minnesota Medical School.

W. J. Tomsicek of Saint Paul, professor of Chemistry at St. Thomas' College, also took part in the lecture series, giving several talks on "Quacks and Cure-Alls."

* * *

The following medical reserve corps officers were recently ordered to extended active duty by the Commanding General, Seventh Corps Area.

Dr. David William Quick, Jr., first lieutenant, Bayport, to Fort Leonard Wood, Missouri.

Dr. Maurice W. Quigley, lieutenant colonel, Minneapolis, to Camp Joseph T. Robinson, Arkansas.

Dr. Carl Gerald Caspers, first lieutenant, Minneapolis.

Dr. Andrew W. Shea, first lieutenant, Minneapolis, to Scott Field, Illinois.

Dr. Louis Alfred Benesh, first lieutenant, Minneapolis, to Fort Francis E. Warren, Wyoming.

Dr. Harold G. Benjamin, first lieutenant, Minneapolis, to Fort Knox, Kentucky.

Dr. Bernard Alton Flesche, first lieutenant, Lake City, to William Beaumont General Hospital, El Paso, Texas.

Dr. Harold Herman Joffe, first lieutenant, Duluth, to Fort Riley, Kansas.

Dr. Hyman Katzovitz, first lieutenant, St. Paul, to Fort Francis E. Warren, Wyoming.

Dr. Richard Sidney King, first lieutenant, Cass Lake, to Fort Francis E. Warren, Wyoming.

Dr. Carleton Walter Leverenz, first lieutenant, St. Paul, Fort Warren.

Dr. Russell C. Lindgren, first lieutenant, Minneapolis, Army and Navy General Hospital, Hot Springs, Arkansas.

Dr. James Joseph Morrow, major, Austin, to Fort Leavenworth, Kansas.

Dr. Hanns Carl Schwyzer, first lieutenant, St. Paul, Fort Leonard Wood, Missouri.

* * *

In Memoriam

William M. Chowning

Dr. William M. Chowning, Minneapolis, died February 8, 1941, at the Veteran's Hospital, Minneapolis.

Born in Millerburgh, Illinois, in 1873, Dr. Chowning was graduated from Knox College, Galesburg, Illinois, and received his B.A. degree from Johns Hopkins University. In 1901 he graduated from the medical school of the University of Minnesota and taught bacteriology and pathology there. He investigated a spotted fever epidemic in the Bitter Root Valley of Montana in 1907.

Dr. Chowning had been a member of the surgical staff of the General Hospital, Minneapolis. He was a major in the World War and organized a war emergency hospital and dispensary for government employes in the District of Columbia. Later he was made chief of the surgical service and commanding officer of base hospital No. 119 and in October, 1918, he was stationed at Savigny, France.

Dr. Chowning was a member of Alpha Kappa Kappa medical fraternity, was a mason and had been a member of the Hennepin County Medical Society until 1923, and two daughters by a former marriage.

Dr. Chowning is survived by his widow and two sons,

Joseph A. Roy

Dr. J. A. Roy of Red Lake Falls died suddenly while making a professional call, January 30, 1941. He was a member of the Red River Valley Medical Society. His death, which came while he was caring for the sick of his community, bespeaks his faithfulness to their trust in him.

Dr. Roy was born at St. Anaclet, Quebec, Canada, December 10, 1888. His preliminary education was obtained at the Seminary of Rimouski, Quebec. He later attended the College of Medicine at the University of Montreal, from which school he graduated with his

doctor's degree in 1913. He started the practice of medicine at Pelee Island on Lake Erie, leaving there to go to Saint Paul, Minnesota, in 1916. After passing the Minnesota State medical examinations, he opened an office in Kensington, Minnesota, where he practiced until 1919, when he moved to Argyle. He continued there until, in 1922, he decided Red Lake Falls would be his final location. This decision was a happy one, both for himself and his community.

Dr. Roy not only believed in serving his community well from the medical standpoint, but also believed that a doctor should take active interest in the civic and fraternal affairs as well. To render practical value to that statement, he was elected mayor of Red Lake Falls in 1931, and served in that capacity until his death terminated his tenure of office. He was active politically also on a national scale and in 1928 was elected Red Lake County Democratic committeeman, and as such attended the inauguration of President Roosevelt in 1933. His activities extended to fraternal matters also, and his leadership in all matters he entered into was finally rewarded by being elected to the office of State Vice-Chief Ranger of the Catholic Order of Foresters in 1930.

Dr. Roy therefore typified the American general practitioner. He was faithful to his trust in matters medical, but felt it also his duty to cultivate his talents in matters civic and fraternal. His loss will be keenly felt by his numerous medical friends and by his community.

Charles Andrew Erdmann

The passing on February 19, 1941, of Dr. Charles A. Erdmann, formerly of the Department of Anatomy at the University Medical School, saddened the several thousands of graduates who had studied anatomy under him.

Dr. Erdmann was born August 3, 1866, at Milwaukee, Wisconsin, the son of Andrew and Elizabeth Fuch Erdmann. He graduated from the University of Wisconsin in 1887 and obtained his M.D. at the University of Minnesota in 1893. For three years as an undergraduate he served as a student assistant in anatomy. Immediately upon graduating he became affiliated with the Department of Anatomy as Demonstrator until 1894. He was Demonstrator in Anatomy and Assistant in Medicine from 1894 until 1898, Assistant Professor of Anatomy in 1898 and 1899, and full professor in 1899. In 1913 he received the title of Associate Professor of Applied Anatomy, which he held until he retired in June, 1936, at the age of seventy. Upon retirement Dr. Erdmann had been active in teaching anatomy at the Medical School for forty-three years, a unique record for a member of the medical school faculty.

Dr. Erdmann was a member of Acacia and of the Nu Sigma Nu medical fraternity. He was also a member of the Hennepin County Medical Society, becoming an affiliate member in 1926. He was elected to honorary membership January 1, 1929.

He was interested and active in Masonic work, having been a member of the University No. 316 A. F. and A. M. Scottish Rite and a life member of the Zuhrah Temple. He was elected an honorary thirty-third degree Mason in 1911.

Surviving Dr. Erdmann are his wife, Caroline, a daughter, Elizabeth, two sons, Robert of Minneapolis and Charles Edgar of Denver, Colorado, and one grandson.

Dr. Erdmann made teaching his life work and loved it. This was evident to the many students who studied under him, with considerable pleasure and interest, a subject ordinarily considered heavy and dull. He was intensely interested in each individual student and was pleased and proud of every success and honor each may have attained and he won the affection of his many students.

The following poem by Louis Burton Woodward was particularly loved by Dr. Erdmann and a copy of the poem was kept on his desk:

Because I would be young in soul and mind
Though years must pass and age my life constrain,
And I have found no way to lag behind
The fleeting years save by the magic chain
That binds me, youthful, to the youth I love,
I teach.

Because I would be wise, and wisdom find
From millions gone before whose torch I pass,
Still burning bright to light the paths that wind
So steep and rugged, for each lad and lass
Slow climbing to the unrevealed above,
I teach.

Because in passing on the living flame,
That ever brighter burns the ages through,
I have done service that is worth the name
Can I but say "The flame of knowledge grew
A little brighter in the hands I taught,"
I teach.

Because I know that when life's end I reach
And thence pass through the gates so wide and deep
To what I do not know, save what men TEACH
That the remembrance of me men will keep
Is what I've done; and what I have is naught,
I teach.

(Louis Burton Woodward.)

ORIGIN OF GREAT CLINICIANS

There is no better student than the son of a medical father if the boy's heart is in the work, but none is worse than he who, not caring for, or even disliking, the practice of medicine, is urged on by a medical parent to qualify in order to take his place. Better even than the student who, having family traditions, takes to medicine almost by instinct is the boy who, lacking any such associations, determines, whilst still a child, that he will be a doctor. For, in this last case, he may have more than an ideal to study and to advance the science of medicine—he may have a real call to heal the sick and alleviate human suffering. It is from this class that the truly great clinician is derived. Often these students are what might be termed freaks in their families. They appear in every social stratum, and their early decision to become doctors seems often to be unrelated to any outside circumstances. F. Wood Jones, in *Doctors in Shirt Sleeves*, edited by Sir Henry Bashford, London, Kegan Paul, Trench, Trubner & Co., Ltd., 1939.

MEDICAL BROADCAST FOR APRIL

The Minnesota State Medical Association broadcasts weekly at 11:00 o'clock every Saturday morning over Station WCCO, Minneapolis, Station WLB, University of Minnesota, and KDAL, Duluth.

Speaker: William A. O'Brien, M.D., Professor of Preventive Medicine and Public Health, Medical School, University of Minnesota.

April 5—Cancer in Women
April 12—Radium and X-ray
April 19—When Cancer Begins
April 26—Tumors of the Mouth

STATE MEETING

More than 3,000 physicians from the northwest states are expected to attend the eighty-eighth annual meeting of the Minnesota State Medical Association to be held May 26, 27 and 28, at the Saint Paul Auditorium.

Preliminary arrangements for this event call for an unusually timely program, an extensive scientific exhibit and attractive social events.

Railroad surgeons of the Great Northern and Northern Pacific Railways will join with the Medical Association for this meeting, the Great Northern Railway Surgeons' Association holding its own regular annual meeting concurrently and all uniting on Tuesday, May 27, for an entire day's program on the subject, "Surgery of Trauma."

Four distinguished out-of-state speakers will speak at this session, including Drs. Thomas M. Joyce of Portland, Clinical Professor of Surgery at the Oregon State University Medical School; Sumner Koch of Chicago, Associate Professor of Surgery at the Northwestern School of Medicine; H. H. Kessler, of Newark, New Jersey, and Leroy Sante of St. Louis, Professor of Radiology at the St. Louis University School of Medicine. Dr. Joyce and Dr. Koch are appearing on the program under the auspices of the Great Northern and the Northern Pacific surgeons, respectively. Dr. Sante will give the annual Russell D. Carman Memorial Lectureship under auspices of the Minnesota Radiological Society as part of this program.

Among other well-known guests are Dr. Edward D. Churchill, John Homan Professor of Surgery at Harvard Medical School; Col. G. C. Dunham, Executive Secretary of the Medical Committee of the National Defense Council, and Mr. C. M. Utley, national president of the Foreign Policy Association. Mr. Utley will speak at the Minnesota Alumni dinner, Monday night, May 26, and Col. Dunham will be principal speaker at the annual banquet on Tuesday.

The golf tournament is scheduled for Sunday, May 25, at the White Bear Yacht Club and on Monday night, following last year's successful precedent, there will be an Open House for all who register and their guests in the Auditorium arena. Exhibits will be open for inspection and for entertainment. There will be a Gay Nineties show and refreshments.

Tuesday and Wednesday noons will be devoted to round-table discussion luncheons, ten on each day, with other reunions and luncheon meetings on Monday.

The meeting will close on Wednesday afternoon, May 28, with a general military session at which physical findings among selectees, the nutrition problem in defense and the part played by physicians in defense and in the fighting forces will be discussed. Col. Dunham is scheduled to address this meeting, together with other medical defense authorities.

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

The American Association of Obstetricians, Gynecologists and Abdominal Surgeons offers again an award known as "The Foundation Prize" consisting of $150.00 to the successful contestant who shall submit the best thesis as judged by the Committee on Award. The competition is open to interns, residents or graduate students in obstetrics, gynecology or abdominal surgery, and to practicing physicians. Manuscripts must be submitted before June 1, 1941.

Further information may be obtained from Jasper R. Bloss, M.D., 418 Eleventh Street, Huntington, West Virginia.

AMERICAN COLLEGE OF SURGEONS

Sectional Meeting

The sectional meeting of the American College of Surgeons held in Minneapolis on March 10, 11 and 12, 1941, did not receive the attention which it deserved from surgeons in this state and the adjoining states because of the inclement weather.

The local committees organized wet and dry clinics for general surgery and the surgical specialties which were as elaborate and numerous as those at the Clinical Congress of the American College of Surgeons. Subjects under discussion included fractures, cancer and hospital administration. The hospital conference held many sessions, some of them beginning as early as 7:45 in the morning. Every phase of hospital management was discussed.

The panel discussions were well organized and well attended, the leaders being men and women prominent in the surgical profession. The same can be said for the scientific exhibits. The American College of Surgeons is interested in the work of the young surgeon, and at the University of Minnesota Hospitals the younger men were encouraged to present research problems of general interest.

Although many wet clinics were held in the various hospitals of Minneapolis, the dry clinics seemed to attract the larger number of surgeons and seemed to be a more effective teaching medium than operative clinics. It was suggested that at future meetings the

rooms located in the headquarters hotel used by the College for panel discussions might also be utilized in the morning hours by the various hospital staffs for dry clinics to obviate transportation of the surgeons to the various private hospitals about the city. If this plan is put into effect, the cancer and fracture clinics could be held in two of the large public hospitals.

The committees on arrangements headed by Dr. W. A. Hanson with the assistance of the Hennepin County Medical Society deserves great praise for the excellent arrangements and the instructive clinics and panel discussions.

A Chapter of the American College of Surgeons was organized during this sectional meeting. It is hoped that members of the College in the Twin Cities who practice the various specialties may become better acquainted since at the present time these various surgical specialties have individual meetings. Dr. F. A. Olson of Minneapolis was elected Chairman of this new chapter.

GILBERT J. THOMAS, M.D.
Member, Board of Regents
American College of Surgeons

ELIAS POTTER LYON MEMORIAL LECTURES

The second annual Elias Potter Lyon Memorial Lectures in the Physiological Sciences will be delivered at the University of Minnesota Medical School, May 1 and 2, at 8 p. m. by Professor Ernst Gellhorn of the Departments of Physiology and Psychiatry of the College of Medicine of the University of Illinois. The lectures will be given in the Medical Sciences Amphitheater.

Professor Gellhorn's lecture subjects will be: "The Neurophysiological Basis of Some General Adjustment Reactions," and "Investigations on the Central Excitation of the Autonomic Nervous System and Their Significance for the Problem of Schizophrenia."

WILLIAM ROOT LECTURE

Dr. Arno B. Luckhardt of the department of physiology at the University of Chicago, will deliver the William Root Lecture, sponsored annually by the Alpha Omega Alpha medical fraternity, in the University of Minnesota Medical Amphitheater, Tuesday, April 29, at 8:15 p. m.

The subject of his lecture will be "Dr. William Beaumont and the Medical Epoch of the Northwest Territory."

ENDOCRINOLOGISTS FORM SOCIETY

Dr. Leo T. Samuels, assistant professor of physiological chemistry at the University of Minnesota Medical School, has been named chairman of the newly organized society of endocrinologists. Meeting at the Coffman Memorial Union, March 12, members of the society heard Dr. Edwin C. Hamblen, associate professor of obstetrics and gynecology at Duke University School of Medicine.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL LECTURE

Dr. Lucien Brouha, physiologist on the Grant Foundation at Harvard University and professor of human biology at the University of Lieges, Belgium, will lecture at the University of Minnesota Medical School, April 22. He will give an illustrated lecture on the functions of the autonomic nervous system.

COURSE IN SURGICAL PATHOLOGY

The Pathology Department at the University Medical School will give a summer short course in surgical pathology from June 16 to July 25. The course will be similar to that given last year, except that it will occupy twenty instead of fifteen hours each week. In addition to the regular course those enrolled will attend a tumor clinic each week and an x-ray demonstration of bone tumors.

The course is open to members of the profession. Those interested may communicate with Dr. J. S. McCartney, Department of Pathology, University Medical School, Minneapolis.

BLUE EARTH COUNTY MEDICAL SOCIETY

Fifty years as a family doctor were reviewed by Dr. J. A. Hielscher of Mankato at the February meeting of the Blue Earth County Medical Society.

A member of the first class graduated from the University of Minnesota Medical School in 1891, Dr. Hielscher will complete a half century of practice in Mankato in June.

In his talk, Dr. Hielscher recalled the diphtheria epidemic of the '90's; how he went to Chicago in 1896 to see an appendectomy performed after reading about it for the first time; how when he first started practicing, he harnessed the team to his buggy, heated bricks for his feet and wrapped up in buffalo robes before starting out on a winter call.

The passing of the "good" old days brought from Dr. Hielscher regret for only one phase. "The old family physician is disappearing—and I think it is too bad."

MINNEAPOLIS ACADEMY OF MEDICINE

At the meeting of the Minneapolis Academy of Medicine (formerly the Minneapolis Clinical Club), March 13, at the Minneapolis Club, Dr. Edwin C. Hamblen, associate professor of obstetrics and gynecology at Duke University School of Medicine and chief of the endocrine division of Duke Hospital, Durham, North Carolina, addressed the members on "The Sterol Family."

THE MISSISSIPPI VALLEY MEDICAL SOCIETY

The Mississippi Valley Medical Society offers annually a cash prize of $100.00, a gold medal and a certificate of award for the best essay on any subject of general medical interest (including medical

economics) and practical value to the general practitioner of medicine. Contestants must be members of the American Medical Association who are residents of the United States. The winner will be invited to present his contribution at the next annual meeting of the Mississippi Valley Medical Society at Cedar Rapids, Iowa, October 1-3, 1941. Further details may be obtained from Dr. Harold Swanberg, secretary, 209 W.C. U. Building, Quincy, Illinois.

MINNESOTA PATHOLOGICAL SOCIETY

The program for the meeting of the Minnesota Pathological Society, April 22, follows:

"Pathologic Physiology of the Kidney"—Dr. E. T. Bell

"Vitamin B_1 Deficiency from Fish Diets"—Drs. R. G. Green and C. A. Evans.

SCOTT-CARVER MEDICAL SOCIETY

The Scott-Carver Medical Society met at the Mudbaden Sanatorium in Shakopee, March 11. Dr. Frederick Schaaf of Minneapolis spoke on "Avitaminosis."

WASHINGTON COUNTY SOCIETY

The Washington County Medical Society held its regular monthly meeting at Stillwater, March 11. Dr. Charles E. Rea of Saint Paul addressed the members on the subject of "Cryptorchidism." Dr. B. J. Lannin of Minneapolis, a Fellow in Surgery at the University of Minnesota Medical School, was a visitor.

WINONA AND WABASHA COUNTY SOCIETIES

The tenth annual joint meeting of the Winona and Wabasha County Medical Societies was held at Buena Vista Sanatorium in Wabasha, March 3.

Thirty-one were served at the dinner. The program was arranged by Dr. R. R. Hendrickson, superintendent of the Sanatorium. Dr. H. W. Satterlee of Lewiston, president of the Winona County Medical Society, presided. The addresses were:

An outline of the setup and work done by the medical department of the State Division of Social Welfare. H. E. Hilleboe, M.D., Medical Director.

"Treatment of Some Common Dermatoses"—Dr. F. W. Lynch, M.D., Saint Paul.

"Physical Examinations under the Selective Service Act"—Lt. Col. Hullsick, State Medical Director.

A talk on present trends in medicine and plans of the State Medical Association.—B. J. Branton, M.D., President.

WOMAN'S AUXILIARY

MRS. M. A. NICHOLSON, Duluth, Minnesota, *President*
MRS. E. V. GOLTZ, 2259 Summit Avenue, Saint Paul, *Publicity Chairman*

Only a few more weeks and the members of the Woman's Auxiliary of the American Medical Association will be arriving in Cleveland for their annual convention, June 2-6. Have you made your reservation? If not, send your request *at once* to Dr. Edward F. Kieger, Chairman of Committee on Hotels and Housing, 1604 Terminal Tower Building, Cleveland.

* * *

Mower County Auxiliary held a meeting February 24 at the home of Mrs. F. W. Molgren, in Austin. The regular business meeting was followed by a luncheon and bridge.

* * *

The home of Mrs. O. V. Johnson, Fergus Falls, was the meeting place for members of the *Park Region Auxiliary* recently. The doctors and their wives enjoyed dinner together and after the dinner the Auxiliary members held their business meeting and social hour. Mrs. Norman Baker of Fergus Falls has been selected State Health and Summer Round-Up chairman for the National P.T.A.

* * *

Dr. and Mrs. J. B. Vail and son have left for San Diego, California, where Dr. Vail will be in the Army service. Mrs. Vail is a member of the Park Region Auxiliary and shared honors with Dr. Vail recently at a farewell party which was given by Dr. and Mrs. E. C. Perreten.

* * *

Wabasha County Auxiliary recently elected Mrs. Earle Ellis of Elgin, president. The meeting was held at the home of Mrs. B. J. Bouquet. Mrs. D. G. Mahle of Plainview is the retiring president. Mrs. B. J. Bouquet was elected vice president for another year and Mrs. L. F. Race of Plainview was elected secretary-treasurer to succeed Mrs. M. F. Campion of Lake City. The Auxiliary recently awarded a one dollar prize to Florence Walch of Plainview for her essay on "Tuberculosis," which was judged the best of 160 essays submitted by the five Wabasha County schools.

* * *

The Merchants Hotel at Morris was the scene of the regular meeting of the *West Central Auxiliary*, March 6. After the dinner meeting with the doctors the Auxiliary members met at the home of Mrs. F. W. Behmuler, where Mrs. M. A. Nicholson, state president, was the guest of honor.

An astonishingly large percentage of intelligent people conceive of available knowledge as comprising nearly all that may be known. It has required the shock of many recent discoveries in physics, chemistry, astronomy and biology to make clear the fact that our acquaintance with much that is nearest to us is still distinctly inadequate.—JOHN C. MERRIAM in *Think*.

BOOK REVIEWS

Books listed here become the property of the Ramsey, Hennepin and St. Louis County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

IT IS YOUR LIFE. Keep Healthy, Stay Young. Live Long. Max M. Rosenberg, M.D., Member American Medical Association and New York County Medical Society. Formerly in charge of Clinical Laboratory O.P.D. Beth Israel Hospital, Clinical Assistant Internal Medicine, Beth Israel Hospital, Clinical Assistant in Pediatrics, Gouverneur Hospital. 450 pp. Illus. Price $2.50. New York: The Scholastic Book Press, 1940.

This, enthusiastically proclaims the jacket, differs from the numerous "health and medical advice books" which undertake to teach the reader to diagnose and treat every imaginable disease under the sun, from apoplexy to pinworms. To be really comprehensive it might have made the range to include everything from the Egyptian AAA disease to the Hebrew zaarath, but let that pass; we are not pedantic.

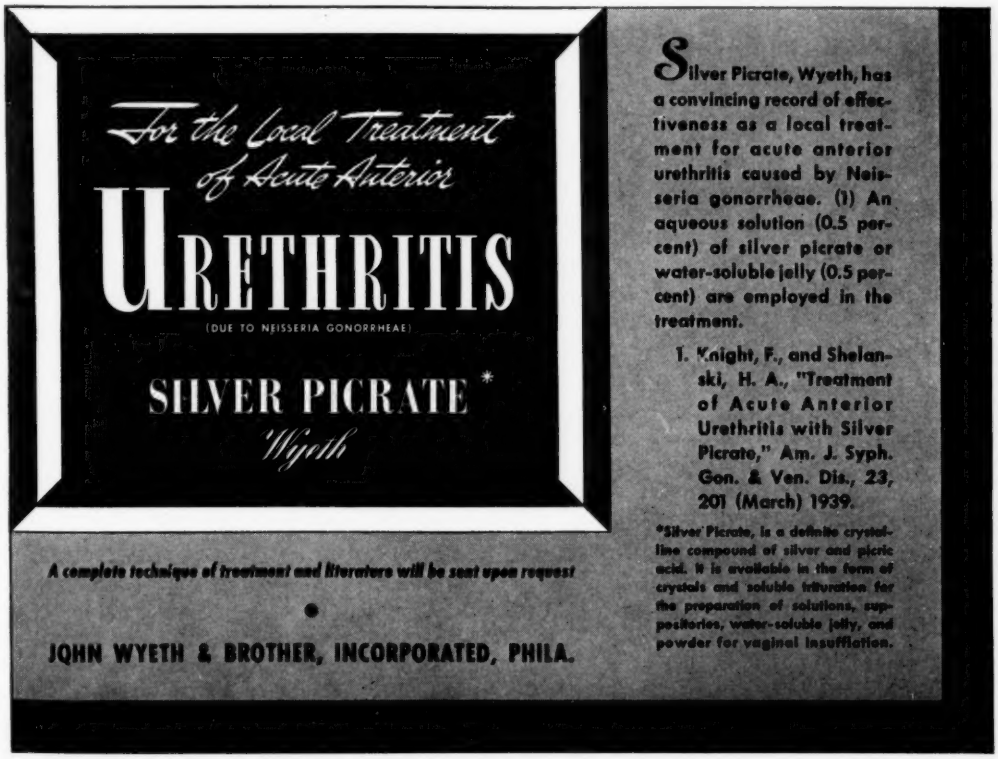
The book contains a lot of fairly good advice on personal hygiene, diet and the cultivation of correct mental attitudes. On the other hand, in his evident desire to reform the race the author goes far afield when he undertakes to impress the baleful effect of various drugs. His attack on the demon rum carries us back to the days of the hobnail liver pictures in the school books. We are not aware of any experienced pathologists who would agree with the author's statement that "autopsies on thousands of cases all over the world have shown that in habitual drinkers all the organs of the body without exception undergo degeneration" followed by the gruesome details.

The author denounces the use of sulfanilamide in a way that would make a patient distrust or discharge a physician who prescribed it and in one place actually advise the reader not to let his doctor give him a certain drug. On the whole, however, he is loyal to his own profession and emphasizes the value of the advice of a competent physician; the latter will have an easier time with his patient if he does not have to argue against some of the pontifical statements in the book.

GILBERT COTTAM.

ILLUSTRATIVE ELECTROCARIOGRAPHY. Julius Burstein, A.B., M.D., Associate Electrocardiographer and Chief of the Cardiac Clinic, Morrisania City Hospital, New York. Originally written by the late Joseph H. Bainton, A.B., M.D., and Julius Burstein, A.B., M.D. Second edition. 292 pages. 106 plates. Price, $4.50. New York, London: D. Appleton-Century Company, Incorporated, 1940.

Beautifully, clearly, concisely, illustratively written. Simple descriptive style, easily understandable; grada-


For the Local Treatment of Acute Anterior
URETHRITIS
(DUE TO NEISSERIA GONORRHEAE)
SILVER PICRATE *
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A complete technique of treatment and literature will be sent upon request
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Silver Picrate, Wyeth, has a convincing record of effectiveness as a local treatment for acute anterior urethritis caused by Neisseria gonorrheae. (1) An aqueous solution (0.5 percent) of silver picrate or water-soluble jelly (0.5 percent) are employed in the treatment.
1. Knight, F., and Shelanski, H. A., "Treatment of Acute Anterior Urethritis with Silver Picrate," Am. J. Syph. Gon. & Ven. Dis., 23, 201 (March) 1939.
*Silver Picrate, is a definite crystalline compound of silver and picric acid. It is available in the form of crystals and soluble trituration for the preparation of solutions, suppositories, water-soluble jelly, and powder for vaginal insufflation.

tion from the simplest of fundamentals through the latest and completest survey of the entire field of electrocardiography.

The new fields of coronary occlusion; precordial (chest) leads; verbatim report on the "Standardization of Precordial Leads" from the American Heart Association and its supplementary report on "Multiple Precordial Leads" are exhaustively and understandably presented. The serial presentations are illuminating and instructive.

The reviewer hopes for a more extensive treatise of electrocardiography in childhood, rheumatic heart disease progress, congenitally defective heart and the miscellaneous group. The third edition will be welcomed, with a shorter publication interval.

LILLIAN L. NYE, M.D.

SYMPOSIUM ON THE SYNAPSE. Herbert S. Gasser, Joseph Erlanger, Detlev W. Bronk, Rafael Lorente de Nó and Alexander Forbes. 113 pages, Illustrated with 25 diagrams and graphs. Springfield, Illinois, and Baltimore, Maryland: Charles C. Thomas, 1939.

The material contained in this booklet formed the subject matter of a symposium on the mechanism of synaptic transmission held in Toronto on April 29, 1939, under the auspices of the American Physiological Society at its annual meeting. Originally published in the *Journal of Neurophysiology* (2:361-472, 1939), it is now reproduced in this form for permanent use, with considerable revision and extension of the papers of Bronk and Lorente de Nó. The voluminous references are properly arranged in alphabetic order and there is an adequate index. It is "Dedicated with respect and affection to Charles Scott Sherrington, O.M., who introduced the concept of The Synapse, as well as the word itself, into the literature of neurophysiology."

The symposium was made up of the following components:

H. S. Gasser, who is Director of the Rockefeller Institute for Medical Research in New York City and acted as chairman of the symposium, contributed the article on axons as examples of nervous tissue, with prominent mention of the recent work of Eccles and Pritchard on the action potential of motorneurones, published in the *Journal of Physiology* (89:43-45, 1937).

Joseph Erlanger, Professor of Physiology in Washington University, Saint Louis, discussed the initiation of impluses in axons and hoped that the evidence he presented would indicate that an electrical mechanism could account for synaptic transmission whatever else might be involved.

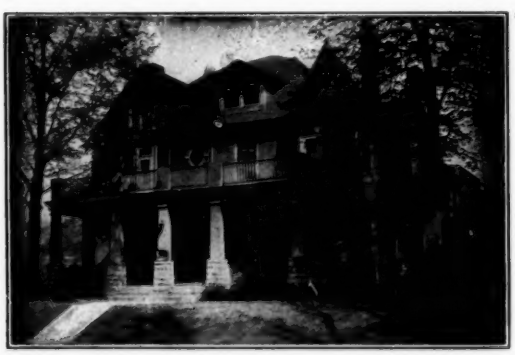
Detlev W. Bronk, Director of the Eldridge Reeves Johnson Research Foundation and of the Institute of Neurology, University of Pennsylvania, Philadelphia, read the third paper, on synaptic mechanisms is sympathetic ganglia, without "desire to defend either the acetylcholine hypothesis or the theory of excitation by circulating currents from the presynaptic terminations. On the other hand I do not wish to oppose them or to adopt a dualistic hypothesis. If it be necessary to do more at this time than describe the phenomena of transmission and relate them into a consistent scheme, I would argue for a pluralistic theory."

Rafael Lorente de Nó, co-worker of Gasser in the Rockefeller Institute, contributed the fourth article, on transmission of impulses through cranial motor nuclei, much the most comprehensive of the five contributions and occupying more than one-half of the space in the book. He mentioned many experiments which have revealed data that have significant bearing on the problem of synaptic transmission of impulses to motorneurons, which help to state but are insufficient to solve the problem.

Alexander Forbes, Professor of Physiology in Harvard Medical School, summed up and commented on the issues involved. The entire symposium revolved around the controversy between those who advocate the original electrical theory of transmission through synapses and those who believe in the newer idea of chemical stimulation, called elsewhere by Walter B. Cannon the electragonists and the chemagonists.

While highly abstruse it should be interesting to anyone who is familiar with the fundamentals of neurophysiology to follow these trained workers into fastnesses of uncharted terrain. That the solution is not yet in sight by no means detracts from the fascination of listening to the arguments and experimental evidence of the controversialists.

GILBERT COTTAM.



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